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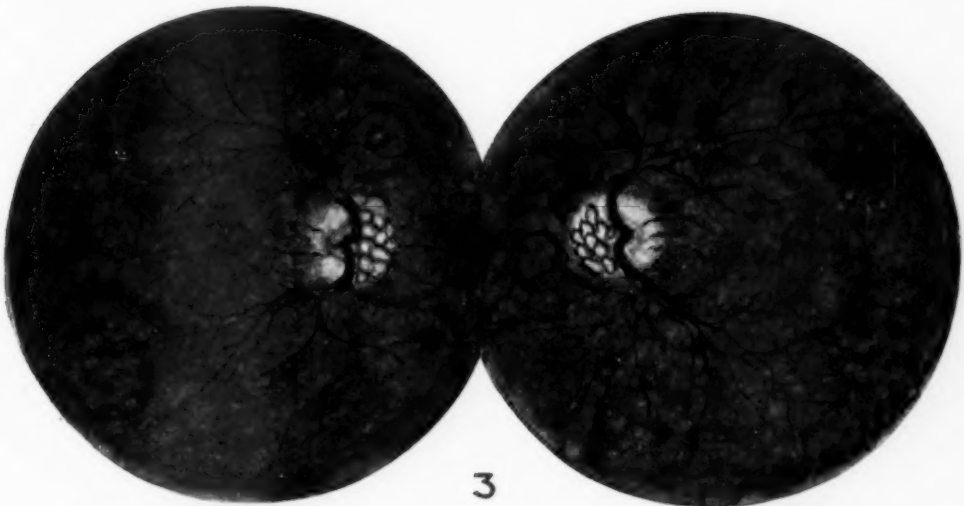
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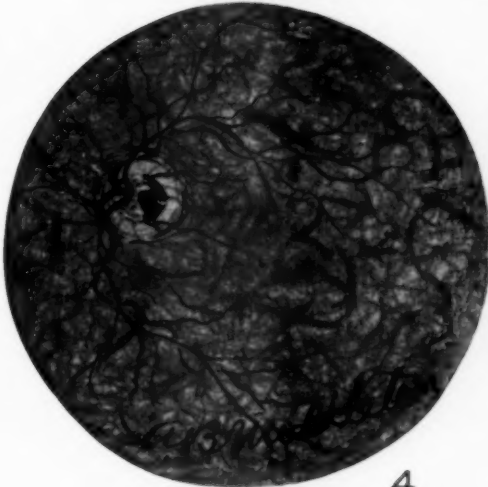
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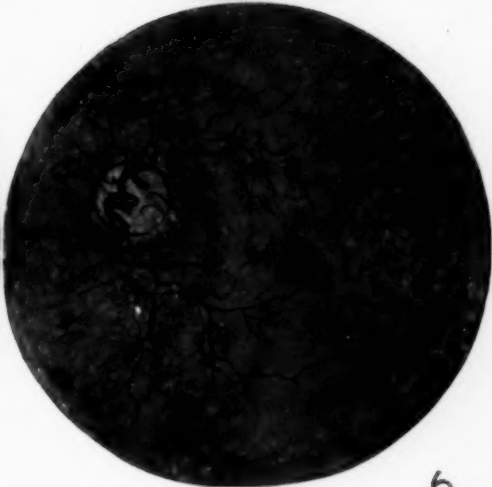
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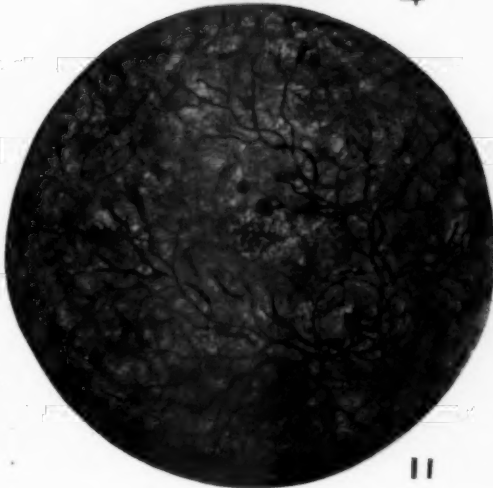
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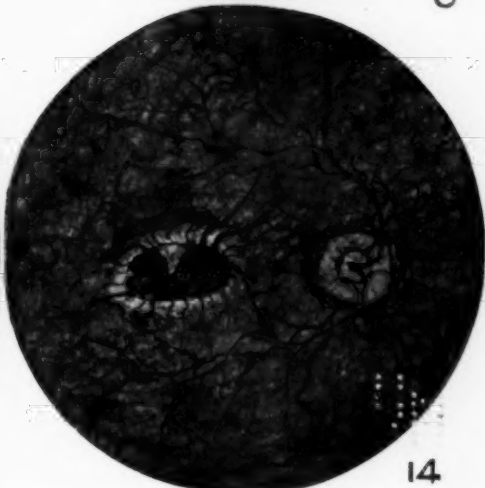
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CONCERNING CONCUSSION AND CONTUSION INJURIES OF THE EYE IN WARFARE.

LT. COL. GEORGE E. DE SCHWEINITZ, M. C., U. S. ARMY.

PHILADELPHIA, PA.

This paper reviews a subject of which our knowledge has been greatly extended by the experiences of the present war. It was read before the College of Physicians of Philadelphia, February 5th, 1919. Authority to publish granted, Board of Publication, S. G. O.

It is plainly evident that in the insistent work, nervous energy and scientific curiosity of life man tries to be "ever reaping something new." Therefore it is that the question is constantly asked by laymen as well as by physicians: "What are the new discoveries, new methods of procedure and new therapeutic measures which the science and art of medicine and surgery have acquired and put into practice during this war, now happily in abeyance?"

They, the investigations of the laboratory and the work of preventive medicine, contribute a long catalog in which ophthalmology has obtained a not inconspicuous place. We could with profit discuss with one another the improvements and advances which have been made in blepharoplasty and keratoplasty, in prosthesis, in dermic and epidermic and cartilage implantations and props, in the extraction of metallic and nonmetallic intraocular foreign bodies, in the prevention of sympathetic ophthalmia and of ocular sepsis and in the improvement of "first aid" technic.

Interesting as such a discussion might prove to be, with your permission, this communication shall concern itself only with some of the results of ocular concussion and contusion—injuries in warfare, and makes mention of some of the pathogenic problems which they present, of certain of the differences which are evident as com-

pared with the results of such injuries in civilian life, and of one or two new clinical pictures.

The experience on which the observations are based was obtained in three "eye centers" of the British Medical Service in France, and two General Hospitals to which wounded were evacuated in England, one French "eye center," and in all of the "eye centers" except one which have been established in this country since the wounded have arrived in large numbers. In the last-named "centers" naturally none of the lesions was of recent date, most of them having occurred weeks, and many of them several months prior to their examination.

Already a large literature has accumulated on this subject and is scattered thru various journals published in France, England, Italy and Germany, and at least two important Atlases have been produced, namely "Atlas d'Ophtalmoscopie de Guerre,"¹ by Lagrange, and "Atlas der Kriegesaugenheilkunde," by v. Szily.² Colonel W. T. Lister³ of the English R. M. C. has made notable contributions, for example, "Pathological Aspects of War Injuries of the Eye." No attempt is made to analyze the scattered literature, but to the text of the two atlases named and to the recorded observations of Colonel Lister constant reference shall be made.

CAUSES.—In general terms the fundus lesions now under discussion are caused *directly* by a blow, or sudden forceful pressure, on the eyeball, behind, from the side, or tangentially; or *indirectly*, by the transmission of concussion or shock.

In the first instance the lesions are classified as *lesions by contact*; in the second instance they are *lesions by concussion*.

The contact lesions are caused, for example, by a missile which grazes the globe but does not rupture it, or by a fragment or portion of a fractured orbital wall or floor or roof, thrust harshly against the eyeball.

The concussion lesions are caused: (a) by concussion at a distance, for instance, violent displacement of air by the explosion of a shell (Lagrange); (b) by transmission of concussion or shock thru the bony facial structures; and moreover, not only thru those near to the eye, to wit, the malar bones and orbital margins, but thru the superior maxilla (especially if the missile passes thru the antrum), and the inferior maxilla, some authors, notably Lagrange, believing that the vibratory concussion proceeds to the orbital contents thru the pterygo-maxillary fossa and fissure; and (c) by slight blows on the anterior part of the eye, the concussion being transmitted thru the transparent media to the posterior pole (Lagrange).

The lesions as usually described may be summarized thus: (1) Lesions by concussion, (2) lesions by impact, and (3) combined lesions, i. e., both by concussion and impact with the lesions in front of or adjacent to the spot of contact, and also immediately opposite to the site of impact; or, in another sense, as lesions which are not associated with and lesions which are associated with fracture or perforation of the orbit (passage of a missile thru it). This rule in the distribution of lesions makes ophthalmoscopic examination of great value in determining the course of the missile.

In the first case, as before noted, the concussion is transmitted from a distance (*par ébranlement de l'air*), or thru the bony facial structures, or thru

the cornea and transparent media, the orbital walls, floor, roof or cavity not being directly injured.

In the second instance, there is traumatism of the frontal region and radiating fracture of the orbital vault, or passage of a missile thru the orbit behind with injury of the optic nerve, but not of the bulb, or passage of a missile thru the orbit tangentially to the eye, grazing it but not rupturing the globe. Should the lesions of the inner membranes result from a concussion at a distance, their development has been attributed to the commotion of the air-column shaking the ocular wall in the same manner as it shakes the door in a room. Should the concussion waves reach the eye in a line of transmission thru the bony facial structure, the effect has been likened to the lifting up and shaking of a ship by a ground swell, and the entire adipose envelope is concussed, resulting in ruptures of the inner ocular coats (Lagrange).

In this connection it may be interesting to quote from an editorial review of Bonnet's⁴ recent contribution to the study of the effect of shell explosions on the human organism, published in the *Journal of the American Medical Association*, February 8, 1919. Bonnet explains the nervous and pulmonary lesions which follow shell explosions by assuming "that the aerial wave-compression acts primarily on the superficial capillaries and bloodvessels, as well as those of the abdominal cavity; in short, those not protected by nature from pressure. There is thus formed a blood column which is driven like a battering ram into incompressible cavities, like the thorax and the cerebrospinal cavity. As a result the smaller vessels in these cavities may rupture, causing varying amounts of injury. The eye and the ear are especially liable to suffer, the former by its position exposed to pressure, and the latter by its physiologic adaptability to receiving pressure."

SYMPTOMATOLOGY.—Of external manifestations there may be none at all, or often at most edema of the lid, diffuse redness, or a patch of congestion or ecchymosis. In other words, absence

of outward signs is not necessarily an indication of lack of intraocular lesions, and moreover, of extensive ones: Therefore routine ophthalmoscopic examination of the eyes of wounded soldiers, whenever possible, has revealed many times elaborate retinochoroidal and vitreous changes. Thus, I examined an English soldier within forty-eight hours after he was hit. He had severe arm and leg wounds and probably tangential orbital injuries. Externally his eyes were practically clear, and yet in both of them there was much vitreous hemorrhage and extensive concussion changes in each fundus.

Naturally, the character and degree of the visual depreciation depends upon the extent, situation and age of the lesions. An interesting and evidently an important fact, dwelt upon by Colonel Lister, is that in severe concussion resulting in commotio retinae, presently to be referred to, vision may be completely lost for several days, followed by a return, and as a matter of course in the serious types there is often permanent reduction of visual acuteness.

The visual field changes evidently depend upon the location of the lesion and its depth and character. But to the correlation of lesions of the retina with defects in the field of vision much study has been given, especially by Colonel Lister. As a matter of interest his observations may be quoted in summary thus: "Lesions above or below the horizontal plane were found to cause defect in the field out of all proportion to the local disturbance, a 'distribution defect' being found in addition to the local defect due to the lesions. This is due to the fact that not only was the spot struck damaged, but also nerve fibers in the immediate vicinity which were passing on to a more peripheral portion of the retina. This distribution defect is fan-shaped, the expanded portion being peripheral and the nearer the lesion is to the disk, the greater is the blind sector, and vice versa. When the lesion occurs in the horizontal plane there is no 'distribution defect' found, as the fibers supply-

ing the retina in the horizontal line arch around from the disk to their destination, and therefore these lesions can only involve the nerve fibers at their terminations."⁵ Scotomas of various shapes may interpret the macular and paramacular alterations.

Marked reduction of intraocular tension is common in many of these cases. The statement that lowered eyeball tension is an important sign of perforating scleral wounds, and especially of diagnostic import when, for example, a small penetrating wound of the sclera is covered with tumid, and it may be swollen, conjunctiva, must not be taken unreservedly in view of the many observations in this war. Indeed, as the late Mr. Nettleship said in the discussion of a case of prolonged hypotony after contusion recorded by E. Treacher Collins,⁶ the practical interest in the report consisted in the demonstration that reduced tension of the eye does not necessarily mean wound or rupture of the globe.

Collins suggests that diminished tension of short duration is due to increased rate of excretion of intraocular fluid thru expanded normal channels of exit, or to arrest of secretion from paresis of intraocular nerves; and that diminished tension of long duration is due to the formation of new channels of exit, or to rupture of the pectinate ligament, or detachment of the pars ciliaris retinae. Magitot⁷ ascribes the variations in ocular tension to the action of the trauma upon the intraocular vasomotor nervous system.

The ophthalmoscopic pictures of the variously transmitted *concussion* and *impact* effects necessarily vary according to the stage of the process at which they are examined, but in general terms may be divided into *primary* and *secondary* changes.

The commotio retinae of Berlin, so often noted in civilian practice, after blows on the eye, for example, the impact of a tennis ball or a flying cork, may be summarized as follows: Hyperemia of the globe marking the position of contact of the missile; clear media; and gray opalescence of the retina, especially in the macular region,

but also around the papilla, which may be somewhat hyperemic. If the retina under the point of contact is visible, this also may exhibit the white infiltration. In addition, several pale, yellowish spots, and, occasionally, small hemorrhages may be present. The vessels are unchanged, or, in some instances, are contracted (arteries) or distended (veins) and pass over the gray area. A central scotoma may exist. The gray infiltration forms quickly and is also absorbed with rapidity, usually having subsided at the end of two or three days, altho the visual defect may last for longer periods.

The commotio retinae produced by such war injuries as have been referred to differs somewhat from the Berlin type in the presence of more numerous hemorrhages, the yellow tint of the so-called retinal haze, its longer duration and more circumscribed character.

An interesting but evanescent picture has been observed and particularly described by Colonel Lister in the later stages of commotio retinae, after disappearance of the haze; namely, peculiar striae in the vicinity of the macula, almost certainly due to the wrinkling of the swollen retinal layers.

Lister calls attention to the "grossly concussioned fundus," where in the early stages there are widespread clouds of hemorrhage, many gleaming and glistening white particles, which gradually fade, become converted into fibrous tissue, and represent originally patches of coagulation necrosis from rupture of retinal and choroidal vessels.

Lacerations of the choroid and retina, or of their vessels, or of both, followed by hemorrhage beneath the retina and into the vitreous, are common. They depend in part upon stretching of these membranes by the vibrations in the vitreous. They are frequently placed at the posterior pole of the eye and near the papilla. These situations are peculiarly liable, according to some observers, probably because the sclera, thicker around the entrance of the optic nerve than elsewhere, does not readily stretch. Its resistance in this regard causes the effect of the force to be more

potent on the tissue just in front of it. Accumulation of transuded serum and of hemorrhage between the choroid and retina, and between the choroid and sclera may cause detachment of the retina and of the choroid.

The lesions just recited are *primary*, whether due to concussion, contusion, or impact. They naturally lead to the *secondary* lesions, the most important being atrophic chorio-retinitis (spots of atrophy, exposed scleral areas and pigment distribution, heaping and fringing), and proliferating chorioretinitis. If the extravasations on the retina and choroid are absorbed, many of the well-known appearances of pigmented atrophic chorioretinitis are evolved, tho frequently its elaboration is most extensive, especially in fan-shaped, pigmented granular areas. Blood may escape, and often does, into the vitreous and be absorbed, leaving all manner of opacities in its place.

This chorioretinitis proliferans is essentially a cicatricial process; there is organization of hemorrhage, but this is of less importance than its irritating effect on the connective tissue of the retinochoroidal layers, inciting the active proliferation and the formation of tracts, areas and masses of fibrous tissue. The whole process and picture differ materially from the so-called proliferating retinitis of recurring hemorrhages in the vitreous and retina, especially in young subjects, often noted in civilian practice. In the type which follows war injuries the retina and choroid have been ruptured, and the cicatricial process leads rather to a pinning down of the retina by opaque, plastic-looking material than to its detachment, so frequent in the ordinary variety, in which the proliferation arises from extravasated blood, and the numerous membranes, following the vessels, often partly translucent, protrude freely into the vitreous. As you know, Lagrange has constructed in tabular form the chief differential diagnostic points, as briefly indicated.

In the concussion-contusion injuries of the eye in civil life the so-called "holes" at the macula are comparatively common, while, according to

Colonel Lister, these holes in military practice are rare. This, however, has not been my own experience. Within the last six weeks, among about twenty-five cases of the types we are considering, I have seen four typical holes in the macula, the surrounding areas splotted with pigmented retinochoroidal changes.

Some authors, for instance Lagrange, have occasionally noted defective vision, central scotoma and no evidence of ophthalmoscopic change in the macula. This I have not observed, but I have seen a fundus free from pathologic signs, except a delicate stippling of the macula and a minute Y-shaped choroidal rupture; one case recently studied with Major Suker followed a blow delivered on the orbital ridge of the affected eye. It required careful focussing to detect it.

On the other hand, in place of the usual impact and concussion lesions, there may be extensive disorganization of the interior of the eye (without rupture): liquefaction and infiltration of the vitreous, widespread masses of yellowish-white exudation and large detachment of the retina. In a remarkable case recently investigated the soldier had been wounded in the head, probably by a missile passing thru both orbits, and the X-ray showed a large fragment located near the Gasserian ganglion. In the right eye the vitreous was thickly infiltrated, the fundus difficult to see, but covered with yellowish exudation, and the retina detached below. In the left eye, over the disk and partly hiding it, there was a mass of fibrous material; otherwise no changes, and vision 20/xxx. While under observation this left disk within two weeks developed a typical choking of 7 D., depending on late formation of pus in the track of the missile.

Notable are the cases of injury of the optic nerve in the canal, by a missile passing thru the orbit posteriorly, which sometimes cuts across the nerve, or the nerve is injured by a radiating fracture of the orbit. Mostly the result is an irremediable atrophy of the nerve and blindness. Hematoma of the sheath of the optic nerve has often

been found, resulting in atrophy. Peripapillary hemorrhage in these cases is rare; but a peripapillary brown ring, due to hemic pigment, is a diagnostic symptom in the later stages. Atrophy of the nerve is the usual result.

Avulsion of the optic nerve, which is jerked from its socket, is not infrequent. After the hemorrhage absorbs a traumatic excavation is visible—a kind of "coloboma or surgical conus," as Lagrange calls it. This may be filled up later with proliferated connective tissue. The retinal vessels above and below the excavation may be comparatively normal. This has been often noted, and recently well figured and commented upon by Edward Jackson.⁸ In the report of Parsons' case of division of the optic nerve by a stab-wound, quoted by Jackson, Parsons⁹ states the vessels refill thru direct and indirect cilioretinal anastomosis, the blood being derived from intact anterior and posterior ciliary arteries. In a case studied within the last two weeks, the missile, i. e., a fragment of a high-explosive shell, entered at the lower and outer angle of the left orbit, shattered the eye, passed behind the root of the nose and probably thru the frontal sinus and certainly thru the posterior part of the orbit and came out beneath the skin of the right temple. The right eye had extensive retinochoroidal changes and the optic nerve had evidently been partly or completely jerked from its entrance. This entrance was covered in with a proliferated fibrous mass, but the vessels were fairly well intact.

Frequency and Distinctiveness of the Lesions.—In general terms, contusion and concussion injuries of the eye in this war have been frequent, and those which have followed oblique wounds of the facial bony structures have represented about 6 to 8 per cent of the whole number. Thus Rollet and Velter, among 3,915 wounded, noted 343 examples of lesions of the deep coats of the eye without disorganization of the eyeball, a percentage of 8.76.⁹ It is of interest to note that a concussion sent thru the maxillofacial area of one side and causing ipsilateral ocular le-

sions is probably prevented from producing like lesions in the opposite eye because the nasal accessory sinuses prevent the concussion or shock from passing to that globe.

There seems very little doubt that lesions of the inner eye by concussion from a distance, by concussion transmitted thru the bony facial structures and following blows on the point of the eye, by preference are located in the macula and paramacular area; that impact lesions are equatorial and always adjacent to the site of contact; that a contact lesion may spread toward the center; that posterior pole and equatorial contact lesions may approach and join each other; and that missiles traversing posterior to the bulb and radiating fractures of the orbital vault are responsible for most of the direct optic nerve injuries. Whether it is safe to say that impact lesions are always, or almost always, retinochoroidal and concussion lesions choroidal, as Lagrange contends, it would seem is not settled.

Unquestionably the difference between concussion changes of the fundus encountered in civil and military practice depends, as Lister points out, in greatest measure upon the fact that in ordinary circumstances the blow is delivered by a comparatively slow-moving object, while in warfare the missile passing thru the orbit moves rapidly.

As special types of concussion and contusion injuries as observed in warfare in comparison with those seen in

civil practice, we may note the character of the commotio retinae, the elaboration of the severely concussed lesions and in particular the distinctive character of the traumatic proliferating chorioretinitis. Finally, it should be noted that all observers comment on the analogy between the mechanism of these concussion injuries of the eye and those of the brain.

Treatment.—In the hope of stimulating extravasated blood and exudation, the usual alternative, diaphoretic and lymphogog remedies (the iodides, sweats and dionin), may be tried, as may electricity, especially for those eyes with much vitreous change. Thyroid extract is also employed. I am frankly skeptical whether remedial agents have much influence, and more than skeptical as to the value of subconjunctival injections. In a certain number of apparently severely concussed eyes after long periods of time there has occurred notable improvement in vision. Transitory astigmatism after direct concussion has often been noted.

[The paper was illustrated and the various types of concussion and impact injuries portrayed by means of a series of diagrams taken from Lagrange's and v. Szily's Atlases, and some water colors by the late Miss Margaretta Washington of concussion injuries in civil practice. Drawings which are to be made of the fundus lesions studied in the various American Eye centers were not at the time available.]

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ACTIVITIES OF THE DIVISION OF SURGERY OF THE HEAD, OFFICE OF THE SURGEON-GENERAL.

COLONEL WALTER R. PARKER, M. C., U. S. ARMY.

DETROIT, MICHIGAN.

This resumé of the organization and work of the Division of Surgery of the Head in the Office of the Surgeon-General of the United States Army was read before the Section of Ophthalmology of the College of Physicians of Philadelphia, December 19, 1918. Authority to publish granted, Board of Publication, S. G. O.

In May 1917 the General Medical Board of the Council of National Defense at the suggestion of Dr. James Bordley Jr., appointed a subcommittee in ophthalmology and in August of the same year authorized a subcommittee in otolaryngology. The personnel of these committees was made up in part at least of members of the committees previously appointed by the special national societies and special sections of the American Medical Association, at the request of the chairman of the General Medical Board of the Council of National Defense.

The personnel of each committee was as follows: Ophthalmology—Dr. James Bordley, Jr., chairman, Dr. George E. de Schweinitz, Dr. Allen Greenwood, Dr. Nelson M. Black, Dr. Walter R. Parker, Dr. W. H. Wilmer; Oto-laryngology—Dr. Charles W. Richardson, chairman, Dr. Harris P. Mosher, Dr. Burt R. Shurly. The work of the subcommittee of Ophthalmology began with the preparation of a catalog of the ophthalmologists of the country which included nearly nine thousand names. To each name a questionnaire was mailed on June 13, 1917 and as a result over fourteen hundred signified their willingness to serve.

The subcommittee of Oto-laryngology later made a similar list of the otolaryngologists of the country and questionnaires were sent to fifty-six hundred oto-laryngologists.

Later the two committees were consolidated and a representative from the army and navy added, together with a representative of brain surgery and oral and plastic surgery. The personnel of the committee as finally constituted was as follows: Dr. Wm. H.

Wilmer, chairman, Dr. Nelson M. Black, secretary, Dr. James Bordley, Jr., Dr. George E. de Schweinitz, Dr. Allen Greenwood, Dr. Walter R. Parker, Dr. Charles W. Richardson, Dr. Charles Bagley, Jr., Dr. Harris P. Mosher, Capt. V. P. Blair, Major T. C. Lyster, M. C., U. S. Army, Surgeon G. E. Tribble, M. C., U. S. Navy. The new members of the joint committee, viz: Dr. Chas. Bagley, Jr., representative of brain surgery and Capt. V. P. Blair representative of plastic and oral surgery, proceeded by means of questionnaires signed by their respective committees, to classify the surgeons in the country who were qualified as brain or plastic and oral surgeons.

The Surgeon General of the Army had been kept in close touch with all phases of the development of the work of these committees and had determined upon the establishment of a division of surgery of the head in his office to be under the charge of Major T. C. Lyster. This plan was authorized July 9, 1917, and quarters in the Surgeon General's office were assigned and opened with the following personnel: Major T. C. Lyster, chief of the division, Major Nelson M. Black, in charge of Ophthalmology, Major Harris P. Mosher, in charge of Oto-laryngology, Capt. Chas Bagley, Jr., in charge of brain surgery, Capt. V. P. Blair in charge of Plastic and Oral surgery. The personnel thus formed in the surgeon general's office worked with the remaining members of the committee, who were on volunteer service in Washington, to secure personnel and develop the organization.

August 15, 1917, the Surgeon General authorized the organization of a special head hospital of one thousand

beds to be operated in connection with the hospitals of the A. E. F. Special committees were appointed to carry out these plans.

With the increased activities of the Division of Surgery of the Head in the Surgeon General's Office it became necessary to increase the personnel of the organization, until finally by the last of September every member of the original committee of the Council was in uniform and all but three on duty in the Surgeon General's Office. Major James Bordley, Jr., was assigned to the Division of Reconstruction, Major Wm. H. Wilmer to aviation, Major Burt R. Shurly was director of the Red Cross Hospital No. 36 which went to France early and is still functioning overseas. Three additional officers were added to the staff in the Surgeon General's Office making the personnel of the Division as follows: Major T. C. Lyster, in charge of the division; Major Nelson M. Black, in charge of Ophthalmology; Major Harris P. Mosher, in charge of Oto-laryngology; Capt. Chas. Bagley, Jr., in charge of Brain Surgery; Capt. V. P. Blair, in charge of Plastic and Oral Surgery; Capt. Robert H. Ivy, assistant in Plastic and Oral Surgery; Major M. G. Seelig, Assistant in Brain Surgery and in charge of publications; Capt. H. H. Kerr, Assistant in Brain Surgery; Major Walter R. Parker, assigned to the Section of Ophthalmology in charge of the construction of Special Head Hospital No. 115; Major Allen Greenwood, assigned to the Section of Ophthalmology with special duties in reference to the personnel of Special Hospital No. 115, Major George E. de Schweinitz, assigned to the Section of Ophthalmology in charge of equipment of Special Hospital No. 115 and especial publications. Later Major Kerr was assigned overseas and Capt. (now Major), Grover C. Pemberty, was assigned Assistant in Brain Surgery.

Major, now Brigadier General, Lyster, in company with Major, (now Lt. Colonel) de Schweinitz and Major, (now Lt. Colonel) Mosher, made a tour of inspection abroad. During the absence of this committee Major, (now

Colonel), Walter R. Parker was placed temporarily in charge of the Division of Surgery of the Head and later was made Officer in Charge. Later Major Blair went overseas and Captain, (now Major), Ivy was left in charge of Plastic and Oral Surgery. Still later Major Ivy went overseas and Major G. V. I. Brown was assigned to his duties.

In the Section of Ophthalmology Major Greenwood went overseas in charge of the Optical Unit. Lieut. Colonel Nelson M. Black soon joined him and when he left the office Lieut. Colonel de Schweinitz was put in charge of Ophthalmology and Major William E. Bruner was assigned to duty in the Surgeon General's Office in connection with Ophthalmology.

During Major Mosher's absence abroad Major Charles W. Richardson was put in charge of Oto-laryngology and later Captain Harry A. Barnes was made assistant in this section.

In addition to classifying the officers available for service, the activities of the division consisted in the selection and standardization of equipment, the preparation of a course of instruction in the base hospitals, organization of special schools and laboratories, assisting in the revision of requirements of registrants, the publication of manuals and periodicals and the recommendation of assignments for overseas duty.

Under the head of equipment might be enumerated the following activities: (1) Standardization of instruments and material; (2) Selection of instruments for base hospitals and for special hospital for surgery of the head (No. 115); (3) Selection of equipment of Optical Units; (4) Standardization of spectacle frames and size of lenses for military use; (5) Investigation of possibility of domestic production of glass for artificial eyes; (6) Standardization of an efficient goggle for aviators.

Under the education activities were included: (1) An outline of the course of lectures to be given at the cantonment base hospitals and at the Medical Officers' Training Camps; (2) List of books for libraries at base hospitals; (3) The organization of the special schools at Ft. Oglethorpe; (4) The

compilation and publication of the following books:

1. The Section of Ophthalmology—Manual of Ophthalmology—published by the Government Printing Office.

2. At the request of the Publishing Committee of the Council of National Defense, three members of the Section of Ophthalmology, Cols. Greenwood de Schweinitz and Parker, prepared a Manual of Ophthalmic Military Surgery including chapters on Trachoma and Examination of Malingers, published by Lea & Febiger.

3. The Section of Brain Surgery prepared a book on War Surgery of the Nervous System published by the Government Printing Office.

4. The Section of Plastic and Oral Surgery revised Blair's book on Surgery and Diseases of the Mouth and Jaw.

5. The Section of Oto-laryngology prepared a Manual of War Surgery on Oto-laryngology.

6. Survey of Head Surgery. A monthly publication.

The following schools and laboratories were established:

1. Officers' School of Plastic and Oral Surgery, Northwestern University Dental School, Chicago, Illinois.

2. Thomas W. Evans' Museum of Oral Surgery, University of Pennsylvania, Philadelphia, Pennsylvania.

3. The Neuro-surgical Schools in Chicago, Philadelphia and New York.

4. The Neuro-surgical, Plastic and Oral Surgical School of St. Louis.

5. School for Medical officers at Ft. Oglethorpe.

6. The laboratory at Baltimore for the investigation of neuro-surgical problems.

7. The laboratory at Ann Arbor for the investigation of peripheral nerve lesions.

The school at Ft. Oglethorpe was represented by each of the Divisions in the Surgeon General's Office including not only medicine, surgery and laboratory but also the Divisions of Special Surgery. The Department of Ophthalmology was organized by Lieut. Colonel de Schweinitz.

The clinical activities incident to the return of injured soldiers led to the consideration of the appointment of consultants in the various sections of the Division of Head Surgery.

The complete record of the activities of the four sections of the Division of Surgery of the Head would not be of interest at this time so I shall give in detail only those pertaining to the Section of Ophthalmology.

The total number of ophthalmologists sent to training camps, base hospitals in this country and overseas was seven hundred and fifty-nine. Of these, two hundred and eighty were assigned to foreign service. In addition to this number three hundred and sixty-seven were transferred to other service making the total of officers assigned by the Section of Ophthalmology eleven hundred and twenty-six.

During the year several extensive inspection tours to study the work of the Division of Surgery of the Head in a large number of the hospitals of the cantonments of this country were made by Lt. Colonel Black, and less extensive similar tours by Major Harris P. Mosher, Major Allen Greenwood, Colonel Walter R. Parker and Lt. Col. George E. de Schweinitz. The work of Lt. Colonel Lyster and his committee overseas included an inspection of all the American base hospitals in operation at that time (from November 19, 1917 to January 31, 1918), three Red Cross hospitals, one Naval Base Hospital and a number of base and general hospitals in the British service and one French sector as well as the general and special hospitals in England, and

Note: Since reading this paper the following appointments were made Dec. 24, 1918: Consultant in Ophthalmology, Lt. Colonel G. E. de Schweinitz; Consultant in Otolaryngology, Lt. Colonel Harris P. Mosher; Consultant in Plastic and Oral Surgery, Lt. Colonel V. P. Blair, and Consultant in Neuro-Surgery, Major Charles H. Frazier.

a study of the method of caring for blinded soldiers in France and England was made by Lt. Col. de Schweinitz.

An elaborate study of the trachoma question was made from all standpoints by Lt. Col. Black, which included the trachoma hospitals and concentration camps, to observe the work of the U. S. Public Health Service in preventing the spread of disease. A standard test for the detection of malingers who feigned visual defects was compiled by Colonel Parker.

After the standardization of the spectacles to be worn by the soldiers was perfected by Major (now Colonel) Wilmer and his committee, a plan was perfected whereby glasses could be supplied through the Post Exchange at wholesale prices. Later this plan was changed and the government now furnishes the soldiers spectacles gratis.

To meet the demand for spectacles for soldiers overseas a central optical unit was established in Paris with fourteen auxiliary units to functionate as mobile supply stations. A central plant

and eight units were taken to France by Major (now Lt. Colonel) Greenwood, who was afterwards made Senior Consultant in Ophthalmology of the A. E. F. and who now has with him as assistants Lt. Colonel Nelson M. Black and Lt. Colonel George Derby.

Pursuant to the authorization of the Surgeon General for the development of the base hospital particularly devoted to surgery of the head to be established in France, a special base hospital was organized at Cape May in February, 1918, was called for overseas duty the 24th of May, 1918, and is now functioning in France with Lieut. Colonel E. C. Ellett as commanding officer and Captain Francis, of Buffalo, in charge of ophthalmology.

The work of the various sections as it is carried out in the base and general hospitals is more or less familiar to all. In closing I wish to speak especially of the complete spirit of cooperation of all who have been associated in this work and of the courtesy and consideration extended to all by the Surgeon General and his entire staff.

SCHOOL OF OPHTHALMOLOGY.

Medical Officers Training Group.

Camp Greenleaf, Ft. Oglethorpe, Ga.

MAJOR MEYER WIENER, M. C., U. S. ARMY.

U. S. GENERAL HOSPITAL, NO. 11, CAPE MAY, N. J.

This paper details the schedule and actual work of the School of Ophthalmology, the organization and development of which was described by Lt. Col. G. E. de Schweinitz (A. J. O., v. 1, p. 817). Read before the College of Physicians of Philadelphia, Feb. 5th, 1919. Authority to publish granted, Board of Publication, S. G. O.

The Army School of Ophthalmology was the outgrowth of plans laid out by our distinguished and able confrere, Lieut. Col. George E. de Schweinitz, who, after several trips to Camp Greenleaf and Ft. Oglethorpe, selected the site, equipment and finally the instructors to direct and develop the school.

I arrived at Camp Greenleaf under War Department orders on July 19, 1918, and started on my course of military training with no idea as to what work I was to do, or where I was to be

assigned. On July 30, I was ordered to report for duty to Lieut. Col. de Schweinitz, as instructor in the school of Ophthalmology. The length of the course had already been determined by the proper authorities, to be four weeks, and the hours from 9 to 11:30 and 1:30 to 4, daily, excepting Saturday, when the hours were limited from 9 to 11. Col. de Schweinitz thought from the beginning that the two hours Saturday morning could be taken up to best advantage with written and

oral quiz, and this proved so satisfactory that the plan was continued thruout the life of the school. There remained 25 hours each week, or a total of 100 teaching hours for the course. I was asked to submit a schedule, including two hours of didactic teaching each day, which made a total of forty hours, leaving sixty hours for practical work. After several conferences Col. de Schweinitz finally determined upon a tentative schedule and the school was formally opened on August 12, 1918, with eight student officers. This number rapidly increased, until at one time we were teaching a class of 63 student officers, taxing our facilities to the utmost.

At the time of the organization of the school Captain Alfred Cowan and Lt. L.

G. Campbell, then serving in the eye department of General Hospital No. 14, and Lt. M. E. Brownell lent most effective aid and the heartiest cooperation in establishing an efficient course. Later Lt. F. O. Schwartz, Lt. T. J. Moran, Capt. S. T. Hubbard, Lt. Nicholson, Maj. H. M. Morton, Lt. C. P. Dyer, and Capt. Claude T. Wolfe were in turn added to the teaching faculty. Lt. Moran, a brilliant officer of noble character and splendid training, died during the influenza epidemic, his loss being deeply felt by all who knew him.

The following schedule for the month of December illustrates in a measure the course of study outlined for the school, and from this there was very little deviation:

SCHEDULE OF COURSE IN OPHTHALMOLOGY FOR DECEMBER.

FIRST WEEK					
	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9-10 A. M.	Lecture— Routine of Exam. of Patients— Maj. Wiener.	Lecture— Retinoscopy— Lt. Brownell.	Lecture— Physiological Optics— Maj. Wiener.	Lecture— Functional Testing— Lt. Brownell.	Lecture— Lids and Lacrimal Apparatus— Lt. Schwartz.
10-11:30 A. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
1.30-2.30 P. M.	Lecture— Refraction— Lt. Schwartz.	Lecture— Muscle Testing— Lt. Brownell.	Lecture— Surgery of Lids— Maj. Wiener.	Lecture— Principals of Plastic Surgery— Capt. Davis.	Lecture— Surgery of Conjunctiva— Maj. Wiener.
2.30-3.30 P. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
3.30-3.45 P. M.	Quiz Conference.	Quiz Conference.	Quiz Conference.	Quiz Conference.	Quiz Conference.

(Saturday—9-11 A. M.—Quiz.)

SECOND WEEK					
	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9-10 A. M.	Lecture— Conjunctiva— Lt. Schwartz.	Lecture— Cornea— Capt. Hubbard.	Lecture— Uveal Tract— Capt. Hubbard.	Lecture— Media and Sclera— Capt. Hubbard.	Lecture— Fundus— Maj. Wiener.
10.30-11.30 A. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
1.30-2.30 P. M.	Microscopical Pathology— Progressive Sectional Groups.	Microscopical Pathology— Progressive Sectional Groups.	Lecture— Surgery of Conjunctiva— Maj. Wiener.	Lecture— Surgery of Eye Muscles— Maj. Wiener.	Lecture— Surgery of Orbit— Capt. Hubbard.
2.30-3.30 P. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
3-4 P. M.				Lecture— Accessory Sinuses— Maj. Wiener.	
3.00-3.45 P. M.	Quiz Conference.	Quiz Conference.	Quiz Conference.		Quiz Conference.

(Saturday—9-11 A. M.—Quiz.)

THIRD WEEK

9-10 A. M.	Lecture— Heterotropia— Lt. Brownell.	Lecture— Functional Testing— Lt. Brownell.	Lecture— Pupillary Reflexes and Visual Paths. Capt. Hubbard.	Lecture— Focal Infections— Lt. Schwartz.	Lecture— Fundus— Maj. Wiener.
10-11.30 A. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
1.30-2.30 P. M.	Microscopical Pathology— Progressive Sectional Groups.	Lecture— Fundus— Maj. Wiener.	Lecture— Surgery of Cataracts— Maj. Wiener.	Lecture— Surgery of Glaucoma. Maj. Wiener.	Lecture— Surgery of Foreign Bodies— Maj. Wiener.
2.30-3.30 P. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
3.30-3.45 P. M.	Quiz Conference.	Quiz Conference.	Quiz Conference.	Quiz Conference.	Quiz Conference.

(Saturday—9-11 A. M.—Quiz.)

FOURTH WEEK

9-10 A. M.	Lecture— Injuries— Maj. Wiener.	Lecture— Neurology— Maj. Wiener.		Lecture— Accessory Sinuses— Capt. Davis.	Lecture— X-Ray Localization of Foreign Bodies. Capt. Blaine.
10-11.30 A. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
1.30-2.30 P. M.	Lecture— Fundus— Maj. Wiener.	Lecture— Fundus— Maj. Wiener.		Surgery.	Surgery.
2.30-3.30 P. M.	Practical Work.	Practical Work.	Practical Work.	Practical Work.	Practical Work.
3-4 P. M.	Lecture—Bacteriology and Pathology of Eye—Maj. Keilty.				
3.30-3.45 P. M.	Quiz Conference.			Quiz Conference.	Quiz Conference.

(Saturday—9-11 A. M.—Quiz.)

Practical work in the course includes: Refraction. Muscle Testing. Outlining visual fields and scotomata.

Examinations of fundi in wards and clinic.

Examination of external diseases in patients in wards and clinic.

Operations on pigs' eyes and on patients in General Hospital No. 14, and in West-Eliis Hospital in Chattanooga. The talks on surgery are illustrated by lantern slides and drawings, and are followed by the operation itself on animal eyes, patients or cadaver.

Also practical paper work in ward and demonstration of method of keeping records and cross indexing.

The purpose of the school was twofold. First, to determine those who were fit for Ophthalmology, from those student officers who had been either held by the Surgeon General's Office for that pur-

pose, or had selected eye work of their own volition. This was done, first, by preliminary examination conducted by the director of the school, who decided whether the student officer had had sufficient ground work to be accepted for the course; and by his final qualification given at the termination of the course as determined by the character of his work, both practical and theoretic, as well as written final examinations.

Second, it served as a postgraduate course for those who would have ordinarily been qualified, but tended to produce even greater efficiency.

The dominant thought prevailing throughout the entire period of instruction was to instill the idea of system in the method of examination of patients and recording of cases; which always, when properly carried out, makes for thoroughness and efficiency.

I wish to state here that the men who stood highest in their profession and proved the most efficient in their work were the ones who were most anxious to take the course and expressed the greatest appreciation for what they got out of it.

One might think that a man's previous experience or standing in the community would be sufficient recommendation, but I can recall one officer who had been practicing his specialty for over twenty years in one of our largest cities, with a preliminary European training, who could not even be accepted in the school, altho on account of his years I endeavored to be most liberal and lenient with him. One officer who had been commissioned a major and who had limited his practice to diseases of the eye, did not answer one single question given him on preliminary examination. Another, who had a flourishing practice in one of our large industrial centers and was teaching Ophthalmology in an accredited university, passed such a poor examination, that we could not accept him for the course. In this particular case where the applicant had been giving special instruction in refraction, he was unable to transcribe a prescription for glasses, did not know the action of the ocular muscles and did not realize the influence the muscle balance had in determining the amount of refractive error to be corrected.

I may mention, that in all doubtful cases, the entire staff was consulted as to the disposition of the particular officer, and that I have access to a file containing the record of each question and the answer given by every student officer examined, should any question come up as to the justice of our decision. Occasionally, when there was some doubt as to whether a man might make good or not, he was given the benefit of the doubt, and taken into the course on trial. If he proved to be unworthy, at the end of a week or so, he was sent back for general duty; if he made good, he continued in the course. A few finished who were able to do careful and excellent refraction work, but whose general work otherwise did not come up to requirements.

These were recommended for refraction only. Others who showed unusual proficiency in operative work were recommended accordingly. An unusual opportunity was offered to grade the officers, as each case examined by them was checked up by one of the staff, and every Saturday the entire class was quizzed for one hour by the director, and then in sections by the rest of the staff. On the last Saturday of the course a written quiz was given, one question or more being asked on each of the following subjects: Anatomy, Pathology, Optics, Refraction, Muscles, Diagnosis, Treatment, Ophthalmoscopy, Neurology, and Operations. Each week a conference was held by the staff, the grades of all the members of the class written down by each instructor and submitted to the director. It was surprising how closely these grades coincided, and it was seldom that there was enough difference to even bring up a discussion. When a name came up on which there was a wide difference of opinion by the several members of the staff, his name was recorded by the staff and his work observed more closely than before by all of us. In this manner a satisfactory agreement was always reached.

One interesting feature which developed during the later stages of the school was the quiz conference. It was found that usually the officer finished the case given him to work out in the afternoon fifteen or twenty minutes before closing time and there would be a grand rush to get thru and hasten back to the barracks. We therefore compelled the entire class to assemble the last fifteen minutes of the day and devoted the time to having the student officers ask questions of the instructors on any point which might have come up during the course of their work during that day. This gave rise at times to most interesting, and I think, instructive discussion in clearing up any hazy impression.

The close contact into which I was thrown with such a large number of men practicing the eye as a specialty, impresses me most forcibly with the necessity for a more thoro and sys-

tematic course of training for the specialist.

For our own department, I have thought that some of the heads of the ophthalmologic departments of our leading medical schools might get together and outline a plan for a course of instruction whereby anyone desiring to take up this specialty could be assured of an efficient and effective course of training making for proficiency. I am also convinced that as a fitting climax, each one should strive to secure a certificate from the American Board of Ophthalmic Examiners, as a mark of his capability. I am con-

vinced that this certificate should never be given, as is occasionally the case at present, to a man on his reputation or standing in the community, but that there should be no exception, and anyone desiring this certificate should submit to the same sort of examination.

I believe the leading Ophthalmologists of the country should set an example and express their willingness to cooperate by submitting to this examination, whereby the actual worth of such a certificate would be increased many times and make its possession a goal for which one should strive.

REFRACTION METHODS EMPLOYED IN THE DEPARTMENT OF OPHTHALMOLOGY OF THE ATTENDING SURGEON'S OFFICE, UNITED STATES ARMY, WASHINGTON, D. C.

MAJOR JOHN R. NEWCOMB, M.C., U. S. ARMY.

INDIANAPOLIS, IND.

This paper describes the methods in question with especial emphasis upon objective methods, a subjective test for astigmatism, the card record kept of each case, and the use of a cycloplegic followed by a miotic. Authority to publish granted by the Board of Publications, S. G. O.

The accurate determination of errors of refraction offers to the ophthalmologist a field which, until recent years, has been more or less neglected and which warrants the very best efforts of every man engaged in ophthalmology. The reason for the dislike and frequent neglect which so many ophthalmologists exhibit toward refraction work is due to but one thing and that is the fact that refraction work has not been done scientifically, the element of chance having played a major role, and the ophthalmologist being a scientifically trained man naturally feels a dislike for that phase of his work which presents to him little other than the humdrum, "Is this better or worse?"

Leaving the selection of a lens to the patient's judgment discounts at once the value of any scientific observations which may have been made. The moment the psychology of visual judg-

ment enters as a positive element into the determination of the lens to be prescribed, just that instant the ophthalmologist fails. Frankly or perhaps subconsciously he admits to himself that his work is not good, that luck is in reality the determining factor in the selection of lenses; and that, no matter how he may temper the patient's visual judgment with his own opinion and experience, the result is and always will be largely a matter of luck. Unfortunately, reference to the patient's visual judgment cannot always be wholly eliminated but it can be made to assume a very minor role.

One thousand consecutive refraction cases have been taken as the basis of the statistic feature of this report. The first one thousand patients under forty years of age have been selected and represent a great variety of professions and occupations. A very small proportion of these patients was com-

posed of others than officers and enlisted men of the army. The statistics are compiled from the case records written by the four officers on duty in The Department of Ophthalmology of The Attending Surgeon's Office; and, are, therefore, of greater value than had they been based upon the work of but one man. My associates, Captain W. H. Chandlee, Lieutenant B. J. Larkin and Lieutenant W. J. Creighton have assisted in every way to insure the accuracy of the records.

An analysis of the first one thousand cases of error of refraction shows the various errors to have occurred in the following percentage of frequency:

Emmetropia	0.5%
Simple Hyperopia	8.5%
Simple Hyperopic Astigmatism....	5.7%
Compound Hyperopic Astigmatism	45.8%
Simple Myopia	3.5%
Simple Myopic Astigmatism.....	3.3%
Compound Myopic Astigmatism...	16.9%
Mixed Astigmatism	15.8%

In comparison with previous statistical reports published the percent of emmetropia is higher; due, doubtless, to the fact that these patients represent, as a class, men whose physical condition was of necessity above the average.

Sixty percent of these patients present hyperopia or its astigmatias and the myopic astigmatias are represented by 23.7 per cent. Mixed astigmatism is less than I have reported in previous papers being found in but fifteen and eight-tenths percent. This decrease is probably due to the fact that the men presenting the high degrees of mixed astigmatism possessed insufficient visual acuity to permit their entering the army and therefore did not come under the observation of this department.

The method of examination will now be described in detail with the hope that the routine methods of this department may show an effort toward more scientific refraction, and that the skeptical may be induced to try to substitute objective for subjective methods. The objective method of refraction is not yet perfected, but with its few imperfections it is far more reliable and

infinitely more scientific and accurate than the best of the subjective.

HISTORY. The history card illustrated has proven satisfactory in the recording of all necessary information and with but few changes may be made available for use in private practice. Its advantages are simplicity, brevity and practicability. The use of this card is explained by reference to the illustration.

A normal fundus is indicated by outlining the optic nerve and printing within the circular outline of the nerve the letter "N." Should abnormalities of the fundus be discovered, the words, "See Reverse" may be written within the circle and a drawing and description of the ophthalmoscopic findings made on the reverse side of the history card.

The skiascopic findings are recorded within the large circle as shown in the illustration and the axis, as determined in the dark room, indicated by drawing a line in the corresponding position of the axis of the correcting cylinder. The advantages of using this method of recording ophthalmoscopic and skiascopic findings are that the maximum of information is condensed in small space in the minimum of time and that a glance at the history card immediately gives the desired information.

The reverse side of the card is blank and may be used for drawings or extended notes. On this card of four by six inches all data relative to the average case can be quickly, accurately and comprehensively recorded without unnecessary waste of space.

Vision of each eye, with and without lenses, is recorded; extraocular muscle balance, (E.O.M.), determined and the tension of each eye recorded.

In eliciting the history of symptoms it has been found advisable to follow a definite outline of questions. The nurses on duty take the history and in a general way follow the scheme of questions here outlined.

1. How long have you worn lenses? Present correction how long?
 2. In what way do your eyes trouble you?
 3. Where is the headache usually located?
- (The location of headache is recorded in the

history as frontal, supraorbital, postorbital, temporal, vertical, occipital or nuchal, the so-called "check-rein" sensation.

4. Do you have pain in your eyes? Sharp or dull? Does it follow close work? Is it present following theater or church? Does it come at any particular time of day?

5. Do your eyelids smart or burn? Is there any secretion present in the mornings?

6. Does the light hurt your eyes?

7. Is your sight poor for distance or for close work? When did you first notice this, and has it become worse slowly or rapidly?

8. Have you noticed anything peculiar about lights at night? No rainbow or halo?

9. Are you subject to nervous depression or to nervous irritability? How does it mani-

ance in the guidance of the patient subsequent to the examination.

The history having been completed, and there being no increased tension nor history suggestive of a glaucoma or of a glaucomatous tendency, the cycloplegic is instilled. In this office a solution of homatropin hydrobromat 2 per cent, and erythroxyton hydrochlorid 1 per cent is used for the induction of cycloplegia. One drop of such solution in each eye at ten minute intervals for five instillations is sufficient and the ciliary muscles are relaxed at the end of sixty minutes. There are rare ex-

Attending Surgeon's Office. Washington, D. C. Date: 12/10/18.



Name: **Smith, John** Age: **23** Status: **Pvt. Signal Corps.**

History: O.D.V. = $\frac{20}{200}$ O.S.V. = $\frac{20}{30}$ E.O.M. = **X** T. = **N.**

Vision right eye has always been poor. Now complains of severe frontal and nuchal pain. Palpebral irritation, tardy accommodation. Nervous depression following close work. Theatre headaches and train sickness. Inability to concentrate on close work.

Examination: Date. 12/10/18. Cycloplegic: **Homat. et Coc.**
Myotic: **Eserine.**
Diagnosis:

O.D. Amblyopia ex anopsia.
O.S. Compound hyperopic Astigmia.

R.  O.D. Blank.
O.S.  O.S. +1.00 Sph, +1.50 Cyl, Ax. 90

B-113.

Fig. 1. Sample history card as filled out.

fest itself? Do you have difficulty in going to sleep? Do you have peculiar "floating sensations" when you first lie down? Do you have vertigo?

10. Unclassified symptoms.

Needless to say the nurse does not necessarily ask all these questions, for usually when the patient is given opportunity he will recite his train of symptoms without questioning or prompting. However if the above outline is borne in mind a few additional questions will usually suffice to complete the record. The recording of the symptoms presented by the patient is very valuable, and is of great assist-

ceptions to this. The ideal method of using this cycloplegic is in the form of B. W. ophthalmic discs, each disc containing one fiftieth of a grain of each drug. These discs have not been obtainable during the war. One of these discs placed on the conjunctiva of the lower lid near the outer canthus will produce a cycloplegia equal in degree to that brought about by the use of five drops of the solution and there does not exist the danger of systemic effect.

Whichever is used it is of the utmost importance that pressure be made to exclude the drug from the nasal

passages. After sufficient time has elapsed for the complete absorption of the drug by the ocular tissues, about five minutes, it is neither necessary nor advisable for the patient to continue the pressure against the side of the nose or to keep the eyes closed. Care must be taken . . . in every case to insure the establishment of cycloplegia as well as mydriasis.

OPHTHALMOSCOPIC EXAMINATION. It seems needless to mention that a careful ophthalmoscopic examination should be made of every case refracted. However a surprisingly large number of patients who have previously been examined by oculists have stated that no ophthalmoscopic examination had ever been made in the previous examinations. The electric ophthalmoscope has been found superior in all ways and possesses advantages too numerous to mention.

SKIASCOPIC EXAMINATION. This is by far the most important phase of the examination and skiascopy is an art which can be mastered only by persistent and unlimited practice and constant practical application. The choice of skiascope is important. The most satisfactory instrument to use is equipped with a plane mirror of 18 mm. diameter, the mirror being preferably of Noviol glass, and the mirror should be tested to insure its being a true plane mirror. Irregularities in the mirror surface will lead to faulty results and this is frequently the cause of unsatisfactory results in the skiascopy. A second skiascope of but 10 mm. diameter has been found advantageous but it requires a great deal of practice with so small a mirror before the use of it becomes satisfactory.

The source of light is very important and in this office the most satisfactory light for skiascopy has been obtained from a 60 watt frosted bulb Mazda lamp such as can be obtained from any dealer in electrical supplies. The lamp should be so jacketed as to keep all light off the patient's face. It should be placed between the patient and the operator on a level with the eyes.

The one meter distance between the eye under examination and the skiascope is of utmost importance and great accuracy in maintaining this distance is to be observed. A variation of one or two inches is inconsequential but beyond this slight variation error is certain to result. It is not necessary to employ any mechanical means to maintain this distance as any such appliance is apt to prove annoying and cumbersome. White marks on the black wall of the dark room indicating the distance of one meter make possible the correct placing of the chair for the patient and the stool for the operator.

Skiascopy with trial frame and lenses: The use of the so-called skiascopic frames is not to be recommended as their use leads to hurried, careless methods and the determinations made are gross determinations and merely approximate the actual correction. Experience has shown that the skiascopic correction of first one principal meridian with a spherical lens and then the correction of the opposite principal meridian with a sphere does not give accurate results in the correction of an existing astigmatism. This is very frequently demonstrated in using sphero-cylinder combinations in the skiascopy in the dark room, it being no uncommon thing to find it necessary to change the sphere originally selected when the proper correcting cylinder is superimposed. For example, if a plus one seventy five sphere is found to stop shadow movement in the vertical meridian, but is insufficient for the horizontal; and an additional seventy five cylinder, axis ninety degrees, corrects in the horizontal it is frequently observed that the original sphere of plus one seventy five must be reduced to a one fifty or even less. Had the correction been done with the skiascopic frames the reduction in strength of the sphere for the vertical would not have appeared necessary, and the result would have been an overcorrection in all meridians. For this reason, if for no other, the use of the skiascopic frames is to be heartily condemned. It is the ob-

servation of this office that the use of trial frame with sphero-cylinder combinations in the performance of skiascopy leads to far greater accuracy in results and its use is recommended. The Punktal trial case with the small lenses, and the trial frame or portable phorometer supplied with it, make an ideal equipment for skiascopy. The increased initial expense is more than offset by the very many advantages offered by its use.

The determination of the axis of an existing astigmatism is most often made in the dark room examination. This is true only when the skiascopy is done with the trial frame and sphero-cylinder lenses. Practice will enable the operator to determine with the greatest accuracy and ease the axis of astigmatism, and recourse to subjective methods is very seldom necessary. To those who are exponents of subjective testing this may meet with disapproval; but the fact remains that such a determination is possible and that in this office subjective methods of determining axis are not resorted to in over five percent of all cases refracted.

Skiascopy can no more be described than can the correct playing of the violin; and the technic of skiascopy can only be mastered by hard, patient, studious effort. Several points, I wish to emphasize. First, that the movements of the mirror should be very limited. A tilt of the mirror of four millimeters is usually all that is necessary or advisable. In some cases this range of mirror excursion will have to be extended but it will be found with practice that the mirror movements can be materially reduced in range. One of the most confusing complications of skiascopy may be brought about by too extensive mirror movements. Tilt the mirror just enough to bring out the true shadow movement and a considerable confusion will be avoided. Second: The establishment of the proper distance between the patient's eye and the skiascopic mirror. This should be one meter. Third: The use of a small skiascope is absolutely essential for accurate results. A mirror of 18 mm. is as large as should be used. Fourth:

Proper illumination as described. The electric skiascopes are not good because of the fact that an uneven illumination apparently is not avoidable. In connection with the subject of illumination it should be mentioned that the dark room should be a dark room and not a darkened room. The less outside light entering the room, the better the skiascopy.

Only by recognizing skiascopy as being very difficult of mastery and by hard, diligent practice and observance of all the details of technic can skiascopy be made to serve as it should. Proper application of skiascopy furnishes us the ideal method of determining errors of refraction and the application of proper correcting lenses and if carefully and accurately done it will be found that in most examinations the prescription for lenses may be written directly from the dark room findings without recourse to the subjective methods of examination. This claim will doubtless meet with opposition but such opposition will arise from those who do not perform skiascopy accurately, and from those who do not have faith enough in their dark room work to trust to its practical application in the formulating of the prescription for lenses.

SUBJECTIVE TESTS.

The determination of the axis of astigmatism is not always possible in the dark room examination and subjective tests must occasionally be resorted to. Subjective tests for determining axis are numerous and none without its faults. The criticism to be offered concerning the majority of astigmatism charts is that they are confusing and that the patient is allowed too great latitude in the formation of his visual judgment. The chart in use in this office possesses faults but its one recommendation is its simplicity which in turn means its greater accuracy. All tests for the determination of axis of astigmatism should be made while the patient's eyes are completely under the effect of the cycloplegic and the findings thus made should not be altered, regardless of what the patient's judgment may

seem to indicate, in case a postcycloplegic test is made. Adherence to this point is absolutely necessary and deviation from it means failure.

The astigmatia chart employed in this office is illustrated below. It consists of black and white squares, 15 by 15 m.m., alternately placed in the form of a checkerboard. The chart is twenty-four centimeters in diameter and circular in form.

The chart is used at a distance of twenty feet from the patient or at a lesser distance if more convenient or if necessary on account of reduced visual acuity. The patient's eyes being under

tancy on the part of the patient when the proper axis has been reached, and repeated rotation of the cylinder will prove the accuracy of this test, as the patient will not vary in his selection of axis. The thing is so very simple that almost without exception there is present no confusion on the part of the patient and a repetition of the test is seldom necessary. The test is recommended as being most accurate on account of its simplicity and its use will eliminate much needless confusion and will result in a great saving of time. Its use as compared with the clock-dial and other astigmatia tests will very

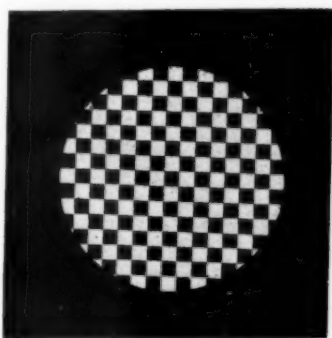


Fig. 2. The checkerboard chart as seen by the emmetropic eye.

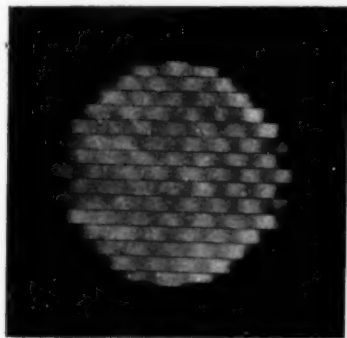


Fig. 3. Checkerboard chart as seen by an eye with simple myopic astigmatia of one diopter, axis 90° , the accommodation being entirely relaxed.

a cycloplegic and the spherical lens being in place in the trial frame, the proper correcting cylindric lens is placed in the frame at the opposite axis to that which was found in the dark room to be correct, or approximately correct.

Before this lens is placed in position, in the faulty position described, the patient is advised that the addition of the cylinder will result in a very decided blurring of the checkerboard. In the words of the patient, "the squares are all mussed up." Having demonstrated this to the patient, slowly turn the cylinder, having instructed the patient to say, "stop," so soon as there appear clean cut black and white squares. With children this test may readily be turned into a game into which they enter with marked enthusiasm. There is rarely any hesi-

tancy and conclusively prove its superior value.

The following illustrations will demonstrate as clearly as photographs can the principle of this test. The camera is made astigmatic by the addition of a cylinder to the lens system. By adding a plus one cylinder at axis 180° the camera is made myopic to the extent of one diopter in the vertical axis. In other words a simple myopic astigmatia is produced. The correcting cylinder, a -1.00 is next introduced into the lens system at right angles to its known proper axis, i.e., at axis 90° instead of at the correct axis of 180° .

Postcycloplegic examinations are sometimes necessary in addition to the dark room findings. As has been stated the postcycloplegic examination is the exception in this office, and when made is really but a verification of the

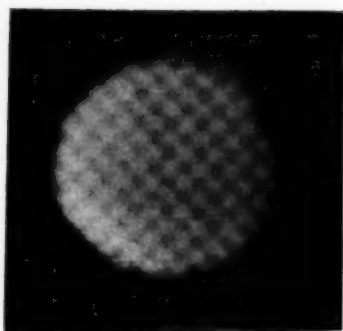


Fig. 4. Same refractive condition as above illustrated with the correcting cylinder placed at 90° instead of at 180° , the proper correcting axis.

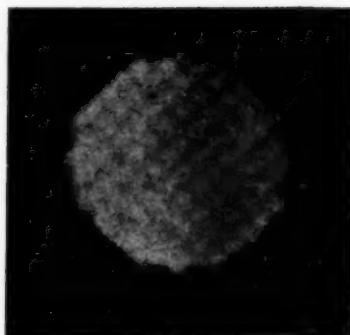


Fig. 5. Correcting cylinder placed 45 degrees from correct position.

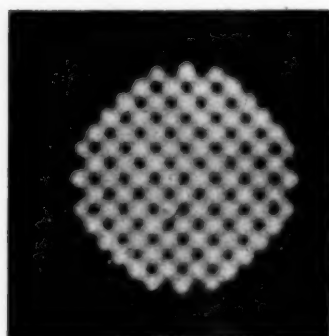


Fig. 6. Correcting cylinder placed 30 degrees from correct position.

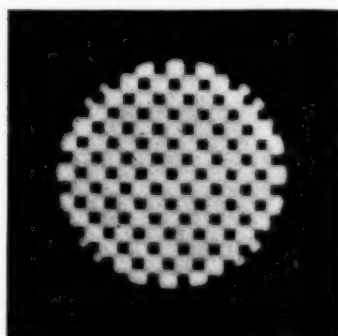


Fig. 7. Correcting cylinder placed 15 degrees from correct position.

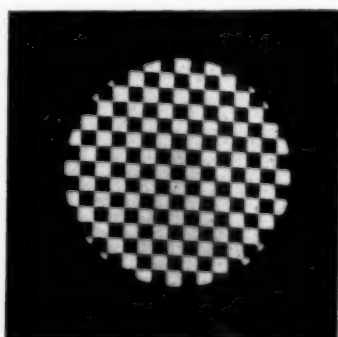


Fig. 8. Correcting cylinder placed 5 degrees from correct position.

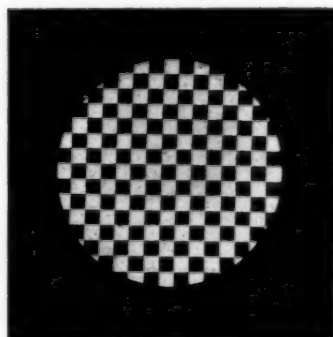


Fig. 9. Correcting cylinder placed 1 degree from correct position.

dark room findings and not a postcycloplegic examination in the broad sense of the word. This is not omitted in an endeavor to save time, but experience has shown these subjective tests to be superfluous in the majority of cases. The postcycloplegic tests for spherical tolerance and axis are made only in those cases in which the axis of astigmatism has not been absolutely determined with the skiascope; and in such cases as present an error of refraction of unusually high degree, particularly if the patient has not had previous experience with lenses. The reason for this is obvious. It must again be emphasized that the dark room findings are not deviated from, there being no digression from the actual findings, and the patient is given no opportunity to detract from the value of a scientific refraction by giving his unreliable and capricious opinions.

The routine use of a *myotic* has been both advocated and denounced; and yet the fact remains that it furnishes us with a most valuable aid, and should be used invariably and without exception following the use of a cycloplegic, in all patients over sixteen years of age. In children its use is not to be advocated on account of the very severe and intense ciliary spasm which is apt to result. In adults this is a very rare thing, but one case having been observed over a period of eleven years constant use. It is a grave mistake for an ophthalmologist to permit a patient to leave his office under the effect of a cycloplegic except in those cases where there exists a therapeutic reason for its continued action.

As before mentioned the ophthalmic disc furnishes the ideal method of application, but during the period of the war it was necessary to revert to the use of the solution. One drop of a one percent solution of eserine sulphate placed in each eye will speedily restore the accommodation with no unpleasant effects arising from its use. Previous to its instillation the patient is warned of the slight muscular twitching and

spasm of the palpebral muscles which persists for a few minutes.

The advantages obtained from using the myotic are, first, safety. A glaucoma will not be a possibility. Second: Patients are enabled to return to any close work within an hour after leaving the office. There are rare exceptions to this. Very frequently the ciliary function is restored in even less time but in some conditions it is two to three hours before the full effect is gained. This varies according to the error of refraction present, the hyperopic eye requiring more time and the myopic less.

In the prescribing of lenses it may be well to mention that all prescriptions from this office call for *spectacles*, except in cases of simple hyperopia or myopia. If sufficient time is taken to explain to the patient the absolute necessity of having the glasses straight there will be found but little opposition to the wearing of spectacles. When patients remain obdurate it is wise and advisable to refuse to accept responsibility for the unsatisfactory results which are sure to follow the wearing of a cylindrical or spherocylindrical lens in any other than a rigid spectacle mounting. After the patient has become accustomed to the spectacles there is no objection to nose glasses for evening wear, for once the eyes have become comfortable following the use of the spectacles the inaccuracy of the nose glasses will speedily be recognized by the patient, due to the return of symptoms.

It has been the purpose of this report to emphasize the importance of observation of all details of refraction work if a uniformity of results is to be expected. It has been possible to dwell upon only a few of the more important features of the work in this report and those selected are the points upon which most ophthalmologists are at variance. The most painstaking examination will be unsuccessful if all the details of technique are not rigidly adhered to throughout the entire course of the examination.

The application of the method of routine refraction which this report has

attempted to discuss may well be adapted to use in private practice without change of material importance. It has been the method followed by the author for eleven years in private practice and the results obtained have proven the reliability and dependability of the objective method of refraction. My associates in the Attending Surgeon's Office have adopted this method of objective refraction; and with the opportunity offered for observing the final results obtained in the refractions

performed in this office, it may be said in all fairness that the objective method of determining and correcting errors of refraction has proven itself to be superior in every respect to subjective methods. The proof has been so convincing and conclusive that all subjective methods have practically been discarded, and the refraction work of the Department of Ophthalmology of The Attending Surgeon's Office is based entirely upon objective methods.

FUNDUS PATHOLOGY WITH THE RED-FREE LIGHT OF VOGT.

ROBERT VON DER HEYDT, M.D.

CHICAGO, ILLINOIS

This paper calls attention to (a) A new Symptom of Retinal Atrophy, and (b) Macular and Foveal Changes. With illustrations showing the apparatus used to furnish the light. Read before the Chicago Ophthalmological Society, February 17, 1919. (See p. 351 for Discussion.)

In the normal fundus the red-free light gives us the first absolute demonstration of the yellow coloring at the

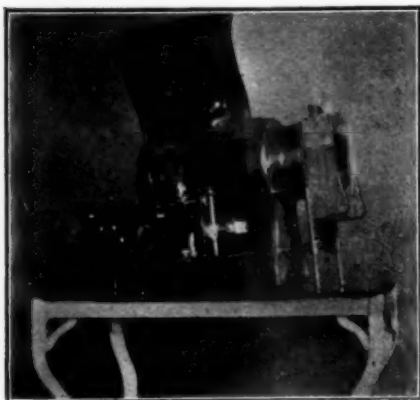


Fig. 1. Lamp with filtration apparatus, after Vogt and Affolter.

macula in the living eye. Owing to an increased contrast new details of the macula and fovea can be seen.

With it we can also measure by comparison the yellow discoloration of the lens in age and in monolateral aphakia.

In addition the increased visibility of the retinal nerve fibers with the red-free light is of great importance. In a

recent article Vogt draws attention to the fact that optic atrophy with our present method of examination is only diagnosable at the nerve-head and from the vessel caliber of the same. The retina, however, though it no doubt is regularly involved in the atrophic process, shows no ophthalmoscopic changes. With the red-free light he is able to see the nerve striations of the retina and study their pathologic changes.

In optic neuritis and retinitis the nerve fibers are coarser, single bundles intermingle, while elsewhere they are interrupted and seem to recede in step-like layers.

Aside from these inflammatory changes he finds certain modifications of the nerve fiber striations in optic atrophy. In complete postneuritic, as well as in primary and glaucomatous atrophy, also in that complicating retinitis pigmentosa and fracture of the base of the skull, there is found a white, marble-like mottling of the surface.

Most interesting and instructive are the cases where one optic nerve is normal and the other atrophic.

A case of this type, following fracture of the base of the skull, five years ago, in a male, now forty-five years of age, is described.

With the ordinary illumination there are no changes except those of atrophy at the nerve-head and its vessels. With the red-free light, however, we find a total absence of the retinal striations in the atrophic eye. In their place there is a delicately mottled marbled surface. Also, a thin, whitish line on either side of the vessels, invisible with ordinary illumination. In a case of partial postneuritic atrophy complicating multiple sclerosis there was a reduction in the visibility of the nerve

retinal vessels which accompany this disease. They are, however, not always present and often difficult of diagnosis. If present they are not necessarily pathognomonic of retrobulbar neuritis. The latter is also true of the so-called temporal pallor of the disc, which is often found in normal fundi.

It is therefore of great practical value that we have in the red-free illumination a method at our disposal with which we can diagnose degenerative changes of the maculopapillary bundle in retrobulbar neuritis.

The changes found with great regularity (eight cases) are the above described absence of striation and a substitution thereof of the marbled zone in the papillomacular bundle.

Vogt has been able to observe similar changes and degenerations in this same retinal zone in cases of ascending atrophy of this central nerve tract in isolated disease, and degeneration of the macular and foveal zone.

Very recent anatomic investigations have proven that the macular zone is practically absent in the eyes of Albinos. The investigations of Vogt and Affolter seem to confirm this as they fail to find the yellow coloration at the macula in the eyes of living Albinos. This leads to the conclusion that the absence of the yellow coloring matter deposited in the macula is in direct or indirect relation to the lack of pigment in general.

In the past few months I have been able to study many fundi with the red-free light. The yellow coloration of the macula is most beautiful. I note a greatly increased visibility of the foveolar reflex of Dimmer. It shows as a most luminous spot, much more glistening, for instance, than any so-called cholesterol crystals I have ever seen.

Further investigation in this zone with the red-free light I am sure will make of greater value the work of Haab, Dimmer, Gullstrand, and others who have made this physiologically so important, and pathologically most vulnerable retinal area, the object of



Fig. 2. Honey-comb appearance of macula.

fibre striae, and in certain zones they were absent.

This herewith described disappearances of retinal striations must be added to the symptomatology of optic atrophy, and must be conceded to be the only known visible ophthalmoscopic sign of retinal atrophy, if we exclude the more or less indefinite picture of shrinking of the vessel caliber. Of especial practical importance are further detailed observations made with the red-free light in retrobulbar neuritis.

In the diagnosis of this quite common and often obscure eye disease, we must at times make absolute dependence on such subjective symptoms as the statement of the patient as to his habits, nyctalopia, central scotoma, etc.

Several authors have drawn attention to degenerative changes in the

so much observation, study and research.

Vogt describes certain pathologic honeycomb-like changes of the macula, visible only in the red-free light. They were found especially in cases of retinitis pigmentosa, and continued during certain long periods. A year later, in one case, he found them less marked. In other very advanced cases they were absent.

Vogt also has noted this vacuoli formation, for a period of several months, in cases of injury to the macula following contusion of the bulb. Later on they gradually disappeared.

gravitate to the altered position. On the patient's resuming the upright attitude they would return to their original site in about two minutes.

Following this experiment a distinct clouding of the clear contents of the cyst above the hyphema was repeatedly noted and continued for a short period, due to a whirling or stirring up of the pigment disturbed in its complete precipitation.

All of these observations prove that cystic degeneration of the macula can produce the condition we call "hole in the macula," and account for the great length of time so often consumed in

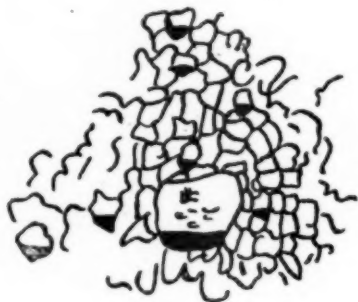


Fig. 3

Effect of change of posture showing gravitation of hyphemae.



Fig. 4

He considers them symptoms of vascular and cystic degeneration of the macula.

Leber has described similar vacuoles of the macula anatomically and presumes that the bursting of some of their thin anterior walls could produce, in time, the condition we know of as "hole in the macula."

Vogt gives a most interesting description of vacuoles of this kind in a case of embolism of the central retinal vein. Two large, nearly circular, spaces in the center of the macula showed a hyphema in their lower thirds. After a few days these two became confluent. Quite a number of other smaller vacuoles, partly containing blood, were visible and remained so for months. If the patient would be examined lying on one or the other side, this precipitate would slide or

gradually bringing about this interesting pathologic condition.

Many new reflexes in various parts of the retina and true folds not due to separation or detachment are fully described by Vogt in several recent articles. Affolter also emphasizes the greater visibility of delicate vitreous opacities, deposits on lens and vascularization of the cornea, with the red-free light.

It is not expected that this method will supersede the ordinary light for ophthalmoscopy. Certain conditions, such as exudative zones, the changes of retinitis proliferans, medullated nerve fibers, and the star figuration of retinitis, for instance, are seen in better contrast with our old light. There is no doubt, however, that with the red-free light we have added a most valuable and helpful method of diagnosis.

NOTES, CASES AND INSTRUMENTS

FOREIGN BODIES IN THE EYE BALL—THREE ILLUSTRATIVE CASES.

JOHN J. O'BRIEN, M. D.

SCHENECTADY, N. Y.

In the literature and in the books we often look in vain for positive, clearcut guidance in difficult problems presented to us. For this reason, the subjoined narrative of types of some common but serious eye injuries may not be without value in helping to form a judgment, upon the correctness of which a life of light or darkness may hang.

CASE I.

In September last, J. M., aged 50 years, was reaming holes in a locomotive boiler in the local plant of the American Locomotive Company. Reamers are made from very hard steel. As the tapered end of the one he was using would not enter the hole, he hit the other end with a hammer. A piece of the brittle steel flew and penetrated his right eyeball 7 mm. to the nasal side of the limbus and 3mm. below the horizontal meridian.

Within an hour after the accident, the foreign body was located by X-ray 14 mm. back of the cornea, 2 mm. from the retina on the temporal side and 5 mm. below the horizontal plane. The particle was 3x3x1 mm. With a magnet the steel was extracted from the globe thru the wound of entrance. There was a little reaction without, but considerable haziness of the vitreous within the eye. On the 17th, the vision was 7/200 and no details of the fundus were visible. Within a week, as there was no pain and the external inflammation had completely subsided, the man insisted on returning to work, which he did. From this time to the present there has been no pain nor other untoward symptoms. He was put on 5 grains of K. I. in a glass of water t. i. d. The haziness of the vitreous slowly cleared, so

that now but a suggestion of it remains. The retina, vessels and papilla are normal and the vision without lens is 20/15 partly.

CASE II.

In July, 1918, J. S., while passing about ten feet away from a man who was chipping a steel casting, was hit in the left eye by what was supposed to be a piece of the chisel. Half an hour after the injury, the eye was quiet and showed a 5 mm. cut thru the conjunctiva and sclera, 12 mm. from the limbus and just below the external rectus tendon. The conjunctiva was loosened and so sutured as to cover the wound in the sclera. Ophthalmoscopic examination showed nothing abnormal; nor did the appearance of the eye suggest a serious injury. The patient was sent home.

An hour later the shop hospital telephoned that there was probably a piece of steel in the eye, so the patient was at once sent for an X-ray examination. The roentgenologist reported a foreign body 1x1½x½ mm. in the vitreous, 5 mm. anterior to the macula lutea. The same day the sutures were removed from the conjunctiva and a magnet applied to the wound. The foreign body was not recovered. An X-ray on the following day showed the foreign body in the original place. Another attempt to extract with the magnet was again a failure. The reaction from this second attempt was severe, so the eye was allowed to quiet. A third X-ray picture by a different roentgenologist was exactly like the two prior ones. A consultant agreed that if the foreign body was not recovered after another trial with the magnet the only safe procedure was enucleation. To this the patient and his parents consented. Another trial with the magnet resulted in another failure. The eye was removed. A most careful autopsy on the eye failed to discover any foreign body. But a subsequent X-ray of the orbit showed

the same foreign body in the same place. It had not entered the globe at all but had passed between the conjunctiva and sclera and lodged in the orbital tissues immediately adjoining the globe.

The roentgenologist of the Manhattan, Eye, Ear and Throat Hospital willingly told me how to avoid a like tragedy in future: Suppose the exposure for the picture is ten seconds. For the first five, have the patient look straight out, then have him change the direction of the visual axis by rolling the eye up as much as possible and complete the exposure. Make another exposure but do not move the eye. If the foreign body is in the globe, the X-ray will show either two bodies or an extension in the direction of the movement of the opacity as compared with the latter picture. When the foreign body is in the orbit or adjacent tissues its position is not affected by any movement the eye will make. There is, however, a slight possibility of error when the foreign body is in an external ocular muscle or tendon. Then it will show some displacement but a careful reading of the picture will discover the true meaning.

CASE III.

Late in the spring of 1918, a boy of twenty was hit in the left eye by a small piece of gunmetal. It penetrated the cornea, iris, lens; and the X-ray showed it as if in the posterior capsule of the latter. The following day the lens was extracted in the hope of removing, with it, the gunmetal. Another picture showed the gunmetal in the original position. A month later an effort was made to remove the foreign body by washing the anterior chamber, using considerable force, but with no better result. The eye recovered so that in a few days it was quiet.

The patient and his father were advised that the safety of the right eye lay only in removing the injured one. They did not take kindly to this advice and consulted another oculist, who took charge of the case. The latter found a nasal sinuitis, treated it and also operated on the eye, with what he

believed a very happy result. Two and a half months after the accident the young man was about to be discharged from the hospital when the right eye became inflamed. Prompt enucleation of the exciting eye had no beneficial effect whatever. Notwithstanding the best hospital care and the most approved energetic therapeutic measures, the vision in the right eye dropped to bare light perception, and so remains.

A considerable experience with foreign body cases has convinced the writer that among the very worst are these where copper and its alloys enter within the globe. Failure of prompt removal of the foreign body should at once be followed by enucleation if disaster is to be averted and a tragic ending avoided. Should one be tempted to gamble with fate, or from any motive fail to sacrifice an eye that is, or almost probably will be blind, the associated memories that persist in hovering about such a case are certainly not pleasurable, whatever profit they may give as experience.

CONVERGENCE INSUFFICIENCY AS IT AFFECTS THE RE- TURNED SOLDIER.

C. E. HILL, M. B.

TORONTO, CANADA.

Men entering the American and Canadian armies were, perforce, examined rapidly in so far as an ocular examination was concerned. This, I infer, would be more noticeable in the Canadian than in the American army, as the call for men was so urgent in 1914 that many men with poor vision slipped thru; and it is needless to say that practically no man was examined for the refined errors of refraction, muscular imbalance and the allied ocular troubles, provided each eye separately had vision equal to the then existing standard. These men, who have been living under new conditions and working in the varied theaters of the war and in all branches of the service, are now returning, and are receiving a thoro examination at the demobiliza-

tion centers before returning to civil life; and it behooves the oculists to see that these so-called minor, but nevertheless very troublesome conditions be recognized and treated accordingly.

In the examination of many hundreds of returned men my attention has been called to the oft repeated complaint, viz.: "I can only do near work, such as reading and writing, for a very short time when suddenly my vision becomes blurred and the lines seem to run together." Following the teaching of Dr. Alexander Duane, I hurriedly ran these men thru the various tests for convergence insufficiency, viz.:

First. Near point of convergence denoted by Dr. Duane as P. C. B.

Second. Screen test for near and far, parallax taken at the same time.

Third. Prism converging power.

Fourth. Prism diverging power.

Fifth. Testing the eyes in the various positions covering one eye then the other.

A. In the primary position at eighteen inches.

B. Eyes looking up and to the right.

C. Eyes looking up and to the left.

D. Eyes looking up in the median line.

E. Eyes looking down in the median line.

F. Eyes looking down and to the right.

G. Eyes looking down and to the left.

H. Eyes looking to the right.

I. Eyes looking to the left.

These tests are rapidly done and they show at a glance if it is a muscular or an associated movement anomaly.

The following is the average of the results obtained:

P. C. B. 100 mm. or over, many running as high as 200 mm.

Slight exophoria or orthophoria for distance and around 10° to 14° prism diopters of exophoria for near.

Prism converging power of 14 prism diopters.

Prism diverging power of 2 or 3 prism diopters.

Diplopia often found at 200 mm. from the base line.

Muscular balance normal in each eye.

Practically all of these cases had normal vision, or 20/30 vision.

All branches of the service were represented in this class with aviation the chief offender. Care was taken to ask pointed questions as to eye troubles or eye strain prior to entering the army, and invariably the answers were that they never knew what eye troubles were till they returned from the front. Considering that most of these men have previously held office positions and are now complaining greatly because of near work, it would seem conclusive evidence that this condition arose while in the service.

This brings me to the reason for writing this paper, viz.: What compensation should these men receive, and what is the best method of treatment? Basing compensation for the loss of one eye at 45 per cent., the question arises, is a man with one eye more handicapped than a man with two which cannot be used for prolonged near work? As most of these conditions are expected to improve under treatment, nevertheless during such time as he is forced to do work less exacting than his former occupation, with usually less financial remuneration, he should be allowed liberal compensation, which can be adjusted on the half-yearly plan and permanently cut off when he recovers.

Treatment is also along Dr. Duane's lines, which are practically the following: Fixing a definite point and gradually bringing the object towards the eyes until it looks double, then close the eyes and repeat many times, care being taken not to force the exercises but to slowly increase the number of times and the periods of treatment. These cases should not be permitted to do a full day's work because of the danger of fagging their convergence, and everything should be done to improve their physical condition. I might add that since starting this paper many aviators have been examined and they have complained that they cannot land

a machine from a nose dive without allowing a considerable time to get the focus, otherwise they will misjudge the distance and crash their machine.

Let me take this opportunity to thank Col. J. T. Fotheringham, D. M. S., and Professor J. M. McCallum for the opportunity of studying these cases in the military clinic at the Toronto General Hospital.

BILATERAL SUBCONJUNCTIVAL HEMORRHAGES.

DR. FRANCISCO M. FERNANDEZ.

HAVANA, CUBA.

This case is a trivial one and would not have been published had it not some curious features that may make it worthy of mention.

A young man, 26 years old, consulted

us, because during the first days of January, 1919, he noticed some small blood spots in his eyes.

On examination we saw very numerous hemorrhagic foci, studding both bulbar conjunctivæ the size of a millet grain, numbering from 20 to 30 in each eye. The hemorrhagic spots were also present in large numbers in both lower conjunctivæ, the upper ones being free from any spots.

The history of the case was negative of any traumatism, lifting heavy weights, cough or vomiting, and the possible explanation of the cause was that the patient had been crying excessively several days previously, on account of the death of his father.

The element of surprise in this case is the possible etiologic factor, and the large number of hemorrhagic foci, as well as the occurrence in both eyes, in a symmetric formation.

SOCIETY PROCEEDINGS

ROYAL SOCIETY OF MEDICINE, SECTION OF OPHTHAL- MOLOGY.

March 28, 1919.

MR. W. T. HOLMES SPICER, President.

Angioid Streaks in Retina.

MR. ELMORE BREWERTON exhibited a patient whose retina presented a peculiar series of angioid streaks. He brought the case because of the extensive character of the change. Tho the condition seemed to be rare, he understood Mr. Spicer had seen the appearance in more than one of his cases. On looking into the literature, he found that Ward Holden attributed such streaks to the remains of diffuse hemorrhage in a linear direction, thru the layers of the retina. But the exhibitor could not imagine blood to follow such lines, except in the nerve fibre layer, and these streaks were not in that, but posterior to it.

W. T. Lister believed the streaks to

be vestiges of new vessels along whose course were arranged exudates which had undergone secondary pigmentation. The streaks in this case, however, Mr. Brewerton did not think were new vessels, as, in the left eye, they met in a lake or pool around the disc, and one could not think of a vessel extending all the way around the disc. In a case reported by Zentmayer that observer said an extravasation of blood was present while the streaks were visible. His own view was that the streaks were the remains of hemorrhage between retina and choroid. Their brown color reminded him of hematin.

The President did not think any explanation yet given of these appearances was satisfactory. He had a brother and sister with an identical condition, except that the pigmentation in those was more marked than in Mr. Brewerton's case. All four eyes of those two patients were involved in the same way. In them, it seemed im-

possible to escape the view that the lines were essentially blood vessels. Another case in which he saw the streaks was that of a very anemic man, whose condition of health was due to severe hematemesis. In the present case the streaks were not on the surface of the retina, as the retinal vessels could clearly be seen coursing over them; their position must be between retina and choroid.

Pigmentation of Cornea.

MISS ROSA FORD showed a patient with congenital pigmentation of the cornea, the pigment appearing in vertical lines.

The President mentioned cases of the kind he had seen, the pigmentation being quite deep, and the lines being, as in this case, vertical. It was not uncommon to meet with staining apart from ulceration, in which case there might not be vessels in the site.

Tumor of Pituitary Body.

MISS FORD also showed a case of what she regarded as pituitary tumor, tho she was unable to find signs of disturbance of pituitary secretion. There was, however, marked contraction of fields and left homonymous hemianopia, and a scotoma in the right field of the right eye. Skiagraphically, the sella turcica appeared to be normal.

Pulsating Tumor of Orbit.

MR. GRIMSDALE exhibited a patient with a pulsating tumor of the orbit, which he regarded as aneurysmal. It appeared to be connected with the supraorbital vessels, and compression of the carotid artery on the same side caused the pulsation to cease. The patient was only 13, a very unusual time of life for such a tumor.

Macular Disease.

MR. RAYNER BATTEN showed a patient with disease of both macula. Three years ago she had acute papillitis, and in the course of a fortnight lost her sight completely. Three months later she could just discern light. She now had opaque white discs and symmetric disease of the macula. A feature about similar cases

he had seen was that the condition occurred at about puberty. This girl had no menstruation for a year.

Intraocular Tumor.

MAJOR CARRUTHERS showed an intraocular growth in a soldier back from the Rhine front. When seen, the left eye was much proptosed, and X-rays showed an increased shadow on the left side. The Wassermann test proved negative. The history given by the man was one of four months—the papers had not come thru—and the first symptom noticed was diplopia. He had 4 D. of optic neuritis. The growth was quite hard. On the advice of a colleague, the man was put upon mercury and iodides, and this was soon followed by a remarkable chemosis, entirely of lymphatic nature; there was no redness, congestion, or vascular engorgement. After 48 hours this cleared up, and the proptosis and optic neuritis subsided a great deal. He was hoping it would turn out to be a gumma, and therefore curable. But the improvement stopped short of cure, and recently there had developed keratitis punctata. He believed the sinuses to be normal.

Pituitary Tumors.

MR. A. W. ORMOND showed a case of pituitary tumor. At first he thought the optic discs were involved secondarily to some nasal trouble, therefore he handed the case over to his rhinologic colleague, who explored both antra and the sphenoid, and removed the anterior end of each turbinal, but without finding anything very definite amiss. He then had the skull skiaographed, and found the sella turcica much enlarged, so that the body of the sphenoid seemed to be eroded away. The visual fields were atypical, as the hemianopia was more on the nasal than on the temporal side. The optic neuritis on both sides, the fact that the patient was gaining flesh, and the general picture, taken with the X-ray disclosures, made him strongly suspect a malignant tumor of the pituitary body. He asked for opinions as to whether puncture should be done thru the sphenoid.

noid, on the chance of relieving the patient if it should prove to be a cyst.

Mr. J. H. Fisher agreed there was great probability that this was a malignant growth with very extensive destruction of the sella turcica. The absence of the typical signs of a tumor starting in the pituitary body, and the absence of the secondary phenomena which pituitary tumors manifested in other parts of the body, pointed to its malignancy. He did not advise puncture.

Mr. L. V. CARGILL also showed a case of pituitary tumor, in a man aged 22, who looked 16. He had left temporal hemianopia and contraction of the right field. Both discs were pale, and there was considerable enlargement of the pituitary fossa, especially anteroposteriorly.

Mr. J. H. Fisher said this case was much more like one of primary disorder of pituitary than Mr. Ormond's. There were disturbances in the secondary sexual characteristics, and the extension in the sella turcica was of a more typical character. He still had under observation a patient, now 35 years of age, in whom the pituitary trouble had been in abeyance for 20 years. In him there was infantilism, coupled with the secondary sexual characteristics remaining undeveloped. He thought an attempt should be made to differentiate cases of disease of the pituitary body itself, and those in which the growth was in its neighborhood.

Dr. James Taylor agreed with Mr. Fisher's view. Before anything of an operative nature was undertaken, he counselled feeding the patient upon pituitary extract. If that did not succeed in giving relief, perhaps relief would be secured by operation, especially if it proved to be a cyst. Mr. Cargill replied that this patient had been fed upon the extract of the gland.

CAPTAIN MAXTED read a paper on the same subject. The patient had the usual symptoms. His diplopia was preceded by intermittent headaches, not severe. The right palpebral fissure was wider than the left; the right pupil semidilated and fixed; no consensual

reaction. There were attacks of epis-taxis, which were attributed to a pharyngitis. He has increasing anemia. Lumbar puncture showed that the cerebrospinal fluid was under considerable tension. The fluid gave a negative Wassermann. Later the patient became dizzy. The transsphenoidal decompression greatly relieved the headaches. The right sphenoidal sinus was explored and found to be filled with a soft hemorrhagic mass, resembling growth; the posterior wall of the sinus was destroyed.

On recovering from the anesthetic, the patient noticed that his sight was much worse, and in a few hours he was practically blind. On the following morning he was completely blind, and neither pupil reacted to light. Five days later the blindness began to clear up. Ten days after the operation vision was R. 1/60, L. 4/60; six weeks after operation, R. 6/60, L. 6/24. The hemorrhagic discharge from the nose continued, the anemia progressed. A further exploration of the nose was carried out, and a vascular growth removed. A tube of radium of 100 mgs. strength was inserted, but five days after that the temperature went up, the patient became delirious, collapsed, and died. At the *post mortem* a large growth was found in the region of the sella turcica, with the optic chiasm stretched over it. There was much erosion of surrounding structures. Both cavernous sinuses were extended to three times the normal size with masses of tumor. There was great destruction of bone in the middle area of the base of the skull.

The paper was discussed by Mr. Fisher and the President.

Migrain.

Mr. J. HERBERT FISHER read a paper on "Migrain." He said the primary classical symptoms of the condition were the scintillating scotomata, followed by localizing, and usually unilateral, headache; which latter culminates in nausea, or even vomiting. In his own case at least two other symptoms had been constant: A marked reduction in the pulse rate during an attack, and a definite increase in renal

activity, resulting in copious pale urine. He had never experienced one of the type-symptoms, disturbance of vision. His headache was always in the left temporofrontal position, and nausea was usual. His attacks usually lasted 48 hours. Sometimes his pulse, during attacks, was as low as 46 beats per minute. During a severe attack his alimentary activity appeared to be in abeyance.

Often in this disease there was a familial tendency. In the female the attacks often coincided with the menstrual periods, and in many cases they ceased during pregnancy, ceasing for good with the onset of the climacteric. In the male the attacks usually stopped at about the fiftieth year. The migraine spectrum usually lasted 20 to 30 minutes, as contrasted with the few seconds duration of the visual aura of epilepsy, the latter also being much more highly organized. It probably had a different explanation in the two conditions. The migraine spectrum was always symmetric, but various parts of the field might be involved. He thought the visual spectra of migraine were produced by irritation of the visual nerve fibers at the base of the brain. The hemicrania developing on the side opposite to the homonymous scintillating scotoma well agreed with the idea that the scotoma was initiated in the optic tract.

There appeared to be only one region in which a lesion, varying in character, could reach the various parts of the basal fibers, so as to explain all varieties of the migraine scotoma, namely, the interpeduncular, and he now suggested the pituitary body as the exciting agent. Slight swelling of the hypophysis would result in sufficient pressure to cause irritation of visual fibers in any of the required positions. And the cessation of migraine during gestation, when the pituitary was greatly modified, and at the climacteric, when the sex power was on the wane, all seemed to favor the view. So also did the renal activity, for the pituitary secreted a hormone which has a direct effect on renal epithelium. He had not expected to find visible

changes in the region by X-rays, because there were probably no bone changes.

Dr. Gordon Holmes pointed out that Mr. Fisher's suggestion had already been put forward by another observer, the reference he would supply. He was skeptical about the theory. If it were true, one would expect to find migrainous phenomena pretty frequently in pituitary tumor cases, or in those in which that body was enlarged, either by tumor formation or physiologically. He was not aware of such phenomena occurring in those cases. His own migrainous attacks were marked by definite visual changes.

Dr. James Taylor thought the condition of the blood pressure would be a better guide to pituitary influence than pulse rate. He looked upon migraine as simply evidence of cortical irritation.

Mr. Leslie Paton described in detail the features of the migrainous attacks to which he had been subject for a number of years, an interesting point in which was the perception of an organized complex visual aura, always in the same setting.

Mr. M. S. Mayou was similarly afflicted, and his attacks were cut short by copious libations of Contrexville waters.

Mr. J. H. Parsons and Mr. J. B. Story continued the discussion

COLORADO OPHTHALMOLOGICAL SOCIETY

Colorado Springs

February 15, 1919.

DR. ALEXANDER C. MAGRUDER,
Presiding.

Tuberculosis of the Conjunctiva.

JAMES A. PATTERSON, Colorado Springs, showed a case of tuberculosis of the conjunctiva in a boy of thirteen years. When the patient was first seen on September 21, 1918, the parents gave a history of enlargement of the parotid gland for some weeks, suspected to be mumps when first observed. The conjunctival trouble had been

present all the summer and had been treated by the family physician with argyrol. The upper lid of the right eye was thickened and gave the appearance of ptosis. A large tumor mass high up under the lid prevented eversion unless great force was used. The bulbar conjunctiva was free from disturbance with the exception of two small reddish elevations near the caruncle. The lower cul de sac contained another elevation, but otherwise the lower lid was free from invasion. There was also at that time great enlargement of the upper part of the parotid gland and of another gland located just below the malar process.

The patient did not appear to be ill, although his appetite was poor and his body weight below normal. He had been brought to Colorado for the relief of asthma, which had disappeared.

There were enlarged tonsils and adenoids, and on account of the difficulty in everting the lid it was decided to accomplish this under general anesthesia given for the removal of the tonsils and adenoids. At the operation on September 25th, the tarsal surface of the upper eyelid was found to be covered with large masses of granulation tissue, the majority of the granules being surmounted with suggestive pale yellow spots. Slightly to the nasal side of the center of the everted lid was a deep ulcer 3 mm. in diameter and penetrating to the cartilage. Thorough scrubbing of the tarsal surface with gauze exposed very tough edges of a linear ulcer extending horizontally along the entire tarsal surface, the ulcer already referred to being as it were the bottom of the crater. The hard edges were trimmed smooth with scissors, and cauterized with nitrat of silver. In removing the tonsils, a large mass of cheesy material was evacuated from the left supratonsillar fossa.

The diagnosis of tuberculosis, originally made from the glandular involvement and the general appearance of the eye condition, was confirmed by microscopic examination of the tissues, the sections showing characteristic areas of caseation and also tubercle bacilli. Photographs were presented

showing the condition of the eyelid three weeks after the operation. The further treatment included applications of glycerit of tannin, trichloroacetic acid, and formaldehyd. As there had been but slight improvement up to November 9th, on that date the use of 1/10,000 mg. of old tuberculin once a week had been begun; the dose having been first increased three weeks before the meeting, and being now 1/5,000 mg. There was a very slight local reaction after the first two injections, and after every dose of the old tuberculin there had been some lessening in size of the glandular swelling, and at the same time a barely noticeable return of the asthmatic wheeze. Of the local applications used the most beneficial had apparently been the trichloroacetic acid, once weekly. There had been some extension of the process inside the lower lid.

DISCUSSION. Melville Black, Denver, thought the general opinion seemed to be that old tuberculin was more valuable for diagnostic purposes than therapeutically; and suggested that bacillary emulsion should be used instead.

George F. Libby, Denver, recalled that in the case of ocular tuberculosis, which he had reported a few years previously, the two principal remedies employed were old tuberculin and direct rays of sunlight in gradually increasing doses. He had been inclined to think that in his case the cure was largely produced by the old tuberculin, but thought that direct sunlight applied to the affected areas for short intervals would be beneficial in Dr. Patterson's case.

Edward Jackson, Denver, thought that this case had been very well worked out. Parinaud's disease had apparently been thoroly excluded by the pathologic findings.

Radiating Lens Opacities.

E. R. NEEPER, Colorado Springs, presented a woman aged 40 years whose eyes had been refracted in 1906, when corrected vision of 20/20ths was obtained in each eye; and again in December, 1917, when the corrected vi-

sion obtained was only, Right 20/50ths plus, and Left 20/30ths, and multiple slight opacities were noticed in each lens. At the present time the corrected vision was approximately the same as in 1917. The opacities were ten or twelve in number, extremely delicate, lying peripherally in about the middle plane of the lens. Dionin had been used for about one year.

DISCUSSION. Edward Jackson, Denver. The arrangement of these opacities is the same as in so-called blue cataract, being outside the undilated pupil, and much better seen by oblique illumination than with the ophthalmoscope, with which they appear rather as refractive differences in the lens, and the whole having a bluish appearance. It would be well to examine this case by ordinary daylight, with the pupil dilated. Even if the case is not exactly what is known as blue cataract, it is probably of that general character; and the prognosis may be relatively good, in that the condition may advance very slowly.

Dr. Neeper said the opacities were very noticeable with the ophthalmoscope.

Melville Black, Denver, suggested that in these cases of opacity of the lens in relatively young people it was necessary to assume disturbance of nutrition of the lens through the ciliary body, which might be due to focal infection. The patient had a large number of filled teeth and one tooth broken off. It would be well to radiograph for the possibility of dead teeth.

Cataract with Doubtful Light Projection.

E. R. NEEPER, Colorado Springs, presented a woman aged 66 years for opinion as to the advisability of extracting a dense cataract from the left eye in view of the fact that this eye was uncertain as to light projection. The vision of the other eye was 20/50ths.

DISCUSSION. Edward Jackson, Denver. It is possible to have a cataract which cuts off light projection completely and yet get good results. This patient apparently perceives the light

wherever it is held. Light projection is relatively best in the slowly forming nuclear cataracts, but in a white cataract of this kind the light diffused from the lens probably drowns out the image of a point of light in the fundus. The reaction of the pupil being excellent gives a good prognosis in this case.

Several other speakers regarded the prognosis as good.

Cataract Extraction, Poor Vision Unexplained.

E. R. NEEPER, Colorado Springs, presented a woman of 67 years upon whose left eye cataract extraction had been done with apparent success, but with unexplained failure to obtain vision. The vision of this eye in January, 1917, was 16/200ths. Light projection was normal. In April, 1918, the vision of the eye was of movements. The atropin used in connection with a successful preliminary iridectomy produced a great deal of irritation. In August, 1918, cataract extraction was done under local anesthesia, and hysocin and morphin hypodermically, no difficulty being encountered. During the first few dressings the patient spoke of good visual results, but the vision soon began to fail and a month later the eye was blind. Later it was discovered that there was slight light perception in the lower temporal quadrant. Transillumination of the eye was normal, but the retina was indistinctly visible, although there was only a very slight capsular opacity. In view of the fact that the vision of the second eye was almost gone, it was important to consider what was responsible for the loss of vision in the eye which had been operated upon. Further, would it be advisable, in operating upon the second eye, to use atropin subconjunctivally?

DISCUSSION. C. E. Walker, Denver, and several other speakers were in favor of needling the capsule, although recognizing that the opacity here did not explain the visual condition.

D. A. Strickler, Denver, suggested that the more frequent use of hyoscin and morphin in nervous cases of cata-

ract extraction was advisable, such patients being very quiet under this treatment.

George F. Libby, Denver, and W. H. Crisp, Denver, were disposed to think that the retina was detached.

Melville Black, Denver, believed that a broad iridectomy done on the second eye some time before extraction was undertaken would avoid the necessity for atropin.

Edward Jackson, Denver, did not consider it advisable to try subconjunctival injection of atropin. He thought that the extraction could be done on the second eye either with or without iridectomy.

W. C. Bane, Denver, would try the use of salt injections subconjunctivally and of iodides internally, on the basis of the possibility of detachment being present.

Penetrating Injuries.

E. R. NEEPER, Colorado Springs, presented a man aged 33 years who on September 13th, 1918, had received a number of injuries from gunshot and particles of brick. The left eye had been destroyed and was enucleated on October 29th. The most important wounds of the right eye were one passing through the lower lid, probably grazing the eyeball on the lower side and entering the sphenoid, and another entering the bulbar conjunctiva 4 mm. to the temporal side of the limbus and also passing into the sphenoid. This latter injury did not puncture the sclera, altho the course of the foreign body was indicated by an anteroposterior line of hemorrhage within the vitreous. The remains of this hemorrhage greatly disturbed the vision of this eye; but the exudate was gradually diminishing, and when the eye was kept still vision of 20/50ths was obtained. There was much retinal edema at first, but this had disappeared. There was marked drainage thru the nose from the posterior orbital cavity or from the nasal sinuses. An x-ray report was to the effect that there were fragments three-quarters of an inch behind the eyeball, probably in the sphenoid.

Dr. Neeper also presented a man aged 26 years whose left eyeball had been injured on June 27, 1918, by the explosion of a water glass on a stationary engine. A piece of glass had cut through the left lower lid, laying it wide open and then through the eyeball, making a 7 mm. vertical incision through the nasal side below the limbus, and had left the eyeball at and below the temporal portion of the disc. Both the eyelid and the anterior wound in the eyeball were stitched. The wound of exit was clearly visible, and there was also a ribbon-shaped exudate which hung vertically in the anterior vitreous to the nasal side. Three days after the injury a vertical line 1 mm. wide, and having a gelatinous appearance, showed on the anterior capsule of the lens. This disappeared after several days. Except for a slight hemorrhage into the vitreous at the point of exit, the media generally had been quite transparent all the time. The vision of this eye, which on July 25th was 20/200ths, was now 20/40ths with or without correction.

Dr. Neeper further presented a man aged 36 years, who on April 19, 1918, had received in the right eye a lacerated wound about 14 mm. long. The wound, which was in the general neighborhood of the upper nasal limbus, included the cornea, iris, lens, conjunctiva, and sclera, and the upper lid near the punctum also showed a 4 mm. wound. The vitreous and iris which projected were clipped off and the wounds were stitched. There was comparatively slight reaction and healing was prompt. The irregular pupil was filled with opaque lens matter in the capsule, but this was clearing gradually. Should dionin and atropin be continued? Should the lens matter be removed? Should the eye be enucleated?

DISCUSSION. W. C. Bane, Denver, as regards the last case, would leave the eye alone, in view of the excellent results.

C. E. Walker, Denver, would be inclined to extract the lens. He was surprised, as regards the case of vitreous prolapse shown by Dr. Neeper, and

also as regards cases previously seen with other members of the society, at the excellent results obtained without operative interference with prolapsed vitreous, and by the use of little or no pressure.

W. H. Crisp, Denver, said that this eye would not be made worse by operating, and that it would be well to get the milky lens out of the way.

D. A. Strickler, Denver, had seen an interesting case, in which an eye which had been cut by being thrown against a wind shield, with a resulting large open wound in the sclera. The eye had healed with vision of 20/30ths after practically open treatment with very little pressure.

Dr. Neeper said that it did not seem right to him to leave intraocular tissue strangulated and protruding from the eye, when it could be cut off with scissors.

Dr. Walker remarked that in the cases to which he had referred nothing had been cut off, and no infection had resulted, the protruding part apparently receding into the eyeball.

Obscure Ocular Infection in Infancy.

F. E. WALLACE, Pueblo, reported a case of severe ocular infection in a baby between the ages of two and six months. At two months of age the preauricular and submaxillary glands of the right side were enlarged, and a few days later a moderate purulent discharge began from the right eye. The amount of pus increased gradually, and the upper lid became swollen and the eyeball red. About two months later the right ear began to discharge. The patient was under the care of a general physician who did not examine the eye. Dr. Wallace first saw the case on January 22, 1919. The moderately swollen upper lid overrode the lower 5 or 6 mm. There was slight mucopurulent discharge, the preauricular glands were moderately and the submaxillary glands more greatly enlarged. The inner half of the tarsal surface of the upper lid was covered with a dirty yellowish membrane, and there were two smaller but similar areas toward the outer end of the tar-

sal surface. The membrane, which was not elevated above the general surface, was very hard to loosen and bled freely. The retrotarsal fold was board-like in consistency, and a dirty white in color. The conjunctiva of the lower lid was affected similarly but to a less degree. The bulbar conjunctiva was edematous, was of purplish red color, and had an elevation of about 2 mm. next to the limbus. The cornea was almost uniformly cloudy, and the details of the iris could not be made out. A culture made from some of the tissues was negative for diphtheria, and examination of the pus showed only the ordinary pus organisms. Under treatment the lids improved but the cornea gradually broke down. The case was lost sight of.

DISCUSSION. C. E. Walker, Denver, thought that the infection was likely to have come originally from the orbital tissue, and might perhaps have burrowed thru the sphenoidal fissure.

Iritis from Antrum Infection.

A. C. Magruder, Colorado Springs, presented a woman in whom bilateral iritis had been due to an infection in the left antrum. The case was first seen on January 14, 1919, when the conjunctiva of each eye was intensely congested, and there was severe pain with photophobia. The irides were sluggish and the pupils were small. The condition had lasted two or three weeks. There was pain on pressure over the left frontal sinus and over the left antrum. The antrum was washed out thru the nose and only boric acid solution was used in the eyes. The next day there was improvement in both eyes and in one week the patient was discharged, the antrum having been washed out four times. The infection was with pneumococcus and staphylococcus.

DISCUSSION. W. C. Bane, Denver, mentioned a case of destructive ulcer of the cornea as the result of which the eye was lost. During treatment of the eye it was discovered that the corresponding antrum contained pus. For some days after washing out the antrum there was marked improvement

in the eye, but the iris was so bound down that it was impossible to get satisfactory drainage within the eye.

Syphilitic Optic Atrophy.

A. C. Magruder, Colorado Springs, presented a man of 37 years who, on January 4, 1917, had come with vision in either eye of 1/10. There was atrophy in the temporal side of each optic disc. Under potassium iodid and mercurial ointment the vision improved in three weeks to 4/10 in each eye. The patient had not been seen again until February 13, 1919, when the vision in each eye was 3/10. There had been no treatment for eighteen months.

W. H. CRISP, Secretary.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA

January 16, 1919.

DR. WILLIAM T. SHOEMAKER, Chairman.

Spontaneous Rupture of the Anterior Lens Capsule with Rapid Develop- ment of Cataract.

DR. WILLIAM ZENTMAYER exhibited a case unique in his experience. A cataract due to a break in the anterior capsule of the lens revealed by the dilatation of the pupil in an eye with an apparently perforating corneal ulcer occasioned surprise which turned to astonishment on the later occurrence of a similar condition of the lens and its capsule in the fellow eye showing no recent signs of trauma or inflammation. O. M., female, aged 19 years, came to the Wills Hospital October 9, 1918. She was employed in weighing powder in a munitions plant. The left eye had been sore for ten days. There was no history of trauma. She was an epileptic. There was moderate photophobia and lacrimation with marked ciliary congestion. The cornea was hazy thruout and showed a perforated ulcer in its lower inner sector corresponding to the position of the pupillary border of the iris. The iris was engaged in the ulcer and the pupillary area was

opaque. This was at the time supposed to be due to exudation. Later, however, when the pupil had been dilated with atropin it was determined to be opaque lens-matter protruding from a rent in the anterior capsule. V. = L. P. In the right eye the cornea showed fine linear and curvilinear gray opacities in its lower and also temporal portion. On the temporal side there was an absence of complete differentiation between the corneal and scleral tissue and there was what appeared to be a small congenital symblepharon. Fundus normal. V. = 6/12.

She was admitted to the hospital, an X-ray was made and appeared negative. Under appropriate treatment the inflammation subsided and when she was discharged on October 21 the globe was white and the anterior chamber shallow, pupil nearly round, there being a slight anterior synechia. The lens was opaque and cortical protruded from the rent in the anterior capsule. V. = hand movements.

After her discharge she was seen a few times in the dispensary for treatment of the affected eye, and on October 25 she again reported, stating that two days previously on arising in the morning she was unable to see to go to work. Vision gradually grew worse. There was very slight ciliary injection; the cornea showed the condition previously noted and the lens was cataractous, cortical matter protruding into the anterior chamber. V. = hand movements. On December 4 a linear extraction was done on the right eye, and on December 16 a needling of the remaining cortical and capsule. January 13: V. = 20/100 + 13 D.

Two possible explanations of the condition present themselves: (1) Tetany and (2) selfinduced trauma. Tetany is a well-recognized cause or accompaniment of cataract. A history of convulsions is present in a not inconsiderable percentage of zonular cataract and there are observers who claim to have found tetany a cause or accompaniment in many cases of senile cataract. It is possible that the associated conditions in the first instance have a common cause in a disturbance

of metabolism arising from abnormalities in the secretion of one or more of the endocrine organs. Whether repeated convulsions could cause a rupture of the capsule in a normal development is doubtful when we consider the frequency of epilepsy and the absence so far as Dr. Zentmayer knew of any previously reported cases of cataract arising in this way. It is conceivable that there may have been a structural weakness of the capsule thru faulty development. The theory of self induction in this case would have had stronger support if the cataract had been combined with a corneal lesion in the second eye. But in this eye there was no evidence of a recent wound or ulcer of the cornea. When the patient presented herself, two days after the loss of vision had been noted, the anterior chamber was shallow and the eye was slightly injected, both symptoms were probably due to the swollen lens.

Dr. Ziegler stated that the three prominent factors to be studied in Dr. Zentmayer's case of ruptured capsule were chemical erosion, ulceration and trauma from the convulsive seizure. Undoubtedly the chemistry of metabolism in an epileptic was always perverted, but whether this could extend to the lens substance was difficult to demonstrate. He had seen a case of exceedingly irritating chemicals in a lens cortex that produced an exacerbation of glaucoma whenever the capsular contents escaped. Ulceration could only be considered by analogy as the history shows such a lesion on one cornea just over the ruptured capsule. Weakening of the capsule, either by erosion or ulceration would undoubtedly encourage traumatic rupture in a case of epileptiform convulsion, but the exact lesion of the capsule could only be determined by withdrawing the ruptured capsule for microscopic examination. This might prove difficult to accomplish.

Dr. Zentmayer, closing the discussion, said the case was seen by Dr. Lucien Howe while he was in Philadelphia and he suggested that it was probably due to injury self induced. Colonel

Parker suggested an abnormality in the capsule and thought that possibly rupture of the capsule might have resulted from the falls when the patient was in convulsion.

Extensive Pigment Changes in the Retina Following Injury.

DR. KRAUSS presented a case of a boy who was struck by a B. B. shot in the left eye. The X-ray two days later showed the ball very plainly in the anterior part of the orbit. Later X-ray plates showed the disappearance of the ball. As no ball could be found, Dr. Krauss thought that the apparent shot in the eye was made by the staining of the tissues by the lead ball. The retinal changes were very marked in the pigment layers, resulting in many pin-head opacities scattered thru the lower half of the eyeball with a large mass to the temporal side.

Dr. C. R. Heed, in discussing the X-ray plates exhibited by Dr. Krauss, directed attention to the symmetric shadows of the anteroposterior and the lateral exposures, indicating that the body casting the shadow must have been spheroidal in shape. Krauss's explanation that the shadows were made by a filmlike deposit on the eyelids does not bear out the shadows on the plates. It is hardly possible that a film of lead on the lids would be shown on the plates after the rays had passed thru the head, but if we concede that such is a possibility the anteroposterior shadow would be circular while the lateral one would be not much more than a line or a narrow ovoid streak.

Burton Chance called attention to the marked pigmentary changes at the posterior pole of the affected eye in Dr. Krauss's case. Changes such as are there presented have been recorded but seldom in recent years. He was sure that the Chairman, Dr. Shoemaker, had seen, alas, too many cases, while it has been his own privilege to have had under observation 30 cases following direct injury to the globe. And he is certain that similar cases will arise frequently in our practice now that the wounded are being returned. It will be interesting to observe the progress

of Dr. Krauss's case and to note whether in the course of time the pigment masses shall disappear only to reveal irreparable lesions of the choroid.

Dr. Ziegler asked Dr. Krauss whether the crescentic ulcers on the lid margins might not be due to friction burns. If a B. B. shot should spin around after striking the tissues it might produce a burn from friction and also make a deposit of lead that would obstruct the passage of the X-rays in at least one direction. Experiment might determine these points.

Disseminated Unilateral Choroiditis.

DR. KRAUSS also reported a case of unilateral disseminated choroiditis, occurring in a seventeen-year-old boy. The lesions varied from a slight yellowish fluffy swelling of the choroid to a more advanced aggregation and absorption of pigment. There were no vitreous opacities. Wassermann, +1.

Dr. Risley said the ophthalmoscopic picture reminded him of the conditions he had seen follow the intravenous injections of salvarsan in a patient with syphilis, who had been under his observation prior to the injection. The occurrence of ocular disease following these injections had been so frequently observed that he regarded it as a serious menace in the use of salvarsan.

Adventitious Hyaloid Membrane.

DR. S. LEWIS ZIEGLER again called attention to the adventitious hyaloid membrane which he thought was forming in the case of V-shaped iridotomy exhibited by him last month. Such a hyaloid membrane is liable to form in any case of aphakia where an incision of the iris or capsule exposes the vitreous body to the action of the aqueous. As a matter of fact, it seldom occurs. Dr. Ziegler had only observed it in some six or eight cases during a period of more than thirty years.

The two characteristic symptoms are: (1) A faint opalescent reflex of the vitreous surface when exposed to oblique illumination; and (2) inability to correct the near vision beyond J-10 or 12, altho the distant vision may have

been corrected up to 20/30. Such a result, of course, does not yield useful reading vision and is a source of annoyance to both patient and physician. In other words, there is a distinct lack of normal proportion between the distant and near vision in an aphakic eye that may otherwise appear to be perfectly normal.

The proper procedure in such a case, altho no capsular membrane is visible, is to make a *pro forma* incision of the vitreous surface exposed in the pupillary area (V-shaped or otherwise), just as tho the original capsule was still *in situ*. In practically every case of this type that Dr. Ziegler had operated on good reading vision (J-1 to 4), had been obtained by this procedure.

In the case of iridotomy shown last month it will be recalled that the distant vision with correcting lens was 20/70 and the vision for near J-12. The hyaloid film was incised on December 28, 1918, and one week later the same glasses yielded a vision of 20/30 and J-1. That this intangible film was really a tangible membrane was further demonstrated by a distinct sensation of iridic retraction and widening of the pupil at the very moment that the film was incised.

Dr. Krauss stated that he had seen similar cases occurring usually after the extraction of the brown or sclerosed type of lens. The healing in these cases is usually quiet with no capsule remaining. The vision is reduced, tho a splendid view of the eyeground is obtained. Dr. Krauss believes that this fine opacity which is seen only by indirect illumination is due to a wrinkling in the anterior limiting membrane of the vitreous. A very free needling thru the pupillary area gives a good result, altho no membrane can be seen to needle.

Dr. S. D. Risley, discussing Dr. Ziegler's case, said that he had several times been disappointed because of the low acuity of vision after successful extractions of cataract leaving an apparently clear black pupil and good but a slightly blurred ophthalmoscopic view of the fundus, and revealing no serious pathologic change in the uvea

or lack of consistency in the vitreous. In using the plane retinoscopic mirror, however, he discovered, when the light from the mirror fell obliquely upon the pupil, a finely striated, iridescent faint sheen back of the pupil, reminding one of the colored sheen seen on the interior of a clam or oyster shell. He had ascribed this appearance to a disturbance of what the anatomist would call the "anterior limiting membrane" of the vitreous body. With this explanation in mind he had not ventured upon any operative interference.

J. MILTON GRISCOM, M. D.,
Clerk.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

FEBRUARY 17, 1919

PRESIDENT, DR. WILLIAM L. NOBLE IN THE
CHAIR.

Fundus Pathology With the Red-Free Light of Vogt.

DR. ROBERT VON DER HEYDT read the paper on this subject published in full in this journal, p. 334.

DISCUSSION.—Dr. Michael Goldenburg said he became so interested in this lamp when Dr. Von der Heydt first called attention to it that he asked him to loan it to him and spent an entire afternoon looking at cases of various kinds. The lamp at present was not perfect, but he felt that Dr. von der Heydt should be given a great deal of credit for his work so far. The light offered wonderful avenues of approach which had never been available before. He had examined a number of cases; and in one that he thought was an embolism of the central retinal artery with hemorrhages, the free blood looked black.

The vascularization upon the disc of very fine vessels, which was not seen with the ordinary illumination was visible as little black lines running across a white field. We were not sure about the nerve fibers, but thought we could see them in one case. It required a good deal of practice to judge these things, and the three who had seen the

case did not think they had sufficient experience to decide. In one case with an apparently normal fundus he had never been able to see the so-called choroidal opacities before, but saw numbers of them when using this light.

Probably the most fascinating part of the red-free light was the ability to see the macula, as bright canary yellow, just like a bright brilliant spot in the blue field. They examined one case that was going through a low-grade form of neuro-retinitis. The patient had had several attacks. He did not feel that he could see the yellow in the macula in that case and neither did Dr. Crossley, but they could see it in the others, of what significance, this might be he did not know.

In the patient he had presented to the Society, where there were fine fibers out to the nasal side, one could see the white lines very thin but visible, and the hemorrhages were apparent, standing out as black spots. He could trace the fibers from the disc out for a way, but not to the macula. but this was probably because he was not familiar with the use of the instrument.

Unquestionably the red-free light would be of unlimited value in the early diagnosis of retinal and optic nerve conditions. In the case of a colored woman examined, he thought his glass had black spots, for in looking at the fundus the ordinary tessellated picture appeared, as definite black and white stripes—a very marked contrast. He had never seen a similar picture.

Dr. E. R. Crossley stated that he had had the pleasure of examining the cases with Dr. Goldenburg and the macula stood out very well. In one comparatively normal case one could see the nerve fibers coming out but could not trace them around the macula as was described. On more experience with the light one might be able to do so. The blood vessels stood out plain and black and it gave a very good view of the macula.

Dr. von der Heydt, in closing, said that Vogt and Affolter had been using

the light since 1913 and had a vast amount of literature on the subject. Last fall he had the filters made and showed them to the Society. With ordinary light it was comparatively simple to use the ophthalmoscope. One could pick up the light anywhere. With the red-free light, however, one had to seek the center of the cone of light. If one got into the periphery one ran into chromatic aberration.

His instrument was so tilted that it threw the cone of light in an upward incline. This enabled him to seat the patient at varying distances, according to his height. He guided himself by the bluish disc, thrown on the window shade, watched the image of the patient's head in it and led his ophthalmoscopic mirror into the center of the cone of light. The colored person, rich in pigment was comparatively a poor subject for the red-free light.

In the embolism case, seen with Dr. Goldenburg, he could not expect to see much more with the red-free light than with ordinary light, because the case was a very recent one. There was still an edema of the retina and it was too early to expect to see the atrophic zones which would later be visible in the fiber layer of the retina.

Orbital Abscesses.

Dr. Robert H. Good read a paper on this subject in which he considered orbital abscesses caused by infections of the anatomic structures adjacent to the orbit, with special reference to the early manifestations of intracranial complications, so that by early operative procedure many cases might be arrested before developing meningitis and brain abscess. These abscesses were either subperiosteal, between periosteum and orbital bony wall, or between the extrinsic muscles with their membranous connections, and the periosteum; or between the extrinsic muscles and the optic nerve in the orbital fat.

Etiology.—1. Subperiosteal abscesses in the orbit were by far the most frequent and were caused by acute and chronic inflammations of the ethmoid, frontal sinus, maxillary sinus

and sphenoid sinus. A good stereo-X-ray would show whether the orbital wall was necrosed or not. Fractures of the orbit might cause a subperiosteal hemorrhage, which, if it became infected, formed an abscess. Extradural abscesses might find their way from the anterior fossa of the skull thru the optic foramen external to the orbital periosteum. However, it was more frequent to have the pus go in the other direction, causing an extradural abscess from the orbital abscess. Tumors in the nose, such as polypi, fibroma and sarcoma, were often the cause of this form of orbital abscess. Tuberculosis and syphilis of the orbital bony wall were common.

2. Abscess between the periosteum and the extrinsic muscles of the eye, with their membranous connective sheath, were caused by an extraperiosteal abscess breaking through the periosteum into this space. Trauma, such as blows, causing hemorrhages in the subcutaneous areolar tissue would form an abscess in this space if the blood clot became infected. Penetrating wounds and foreign bodies along the margin of the orbit, external to the extrinsic muscles of the eye and internal to the periosteum, would cause the abscess to form in this space. In dacryocystitis the sac might rupture into this region. Infection from subconjunctival injections of the eye would form an abscess in this space. Abscess of the lacrimal gland might rupture into this space.

3. Abscesses internal to the extrinsic muscles were in the orbital fat around the optic nerve. As the membranous connective tissue sheath between the extrinsic muscles was very thin, it did not form a great barrier to the abscess external to the extrinsic muscles from breaking into this region. Ulcers of the cornea, panophthalmitis and penetrating wounds of the sclera had caused abscesses in this area of orbital fat. Penetrating wounds and foreign bodies posterior to the bulb and thru the extrinsic muscles, or surgical procedures which entered this space, followed by infection, were sometimes etiologic factors. The

sphenoidal sinus was more frequently responsible for an abscess in the orbital fat than the other sinuses. The serious complications were extradural abscess, optic neuritis, optic atrophy, meningitis, brain abscess and thrombosis of the cavernous sinus.

The extradural space was continuous with the subperiosteal space of the orbit and communicated with each other through the optic foramen, so that a subperiosteal orbital abscess might drain into the extradural space and form an extradural abscess. The optic nerve had the same coverings as the brain, namely, from without in, the inner layer of the dura, arachnoid and the pia. The subdural lymph space in the skull extended all along the optic nerve to the eyeball and the subarachnoid space, which contained the cerebrospinal fluid, and communicated with the subarachnoid space of the optic nerve.

The dura of the optic nerve was only the inner layer of the dura, and was thin compared with the dura of the skull, and it was very vascular with many blood vessels entering it, so that toxins would penetrate it much more readily than the dura of the skull. The dura of the optic nerve differed from the skull dura, in that it did not have the properties of forming bone, and, therefore, was much less dense in structure.

When toxins entered the subdural space of the nerve, they might cause cerebral symptoms, and if they entered the subarachnoid space of the nerve, they resulted in cerebrospinal meningitis because this space was in direct communication with the cerebrospinal fluid. An abscess pressing on the nerve with accompanying edema, as well as absorption of toxins, resulted in optic neuritis and atrophy. An abscess around the optic nerve in the orbital fat pushed the eye straight forward and generally ended in blindness or in meningitis. Involvement of the central vein of the retina or the ophthalmic vein resulted in thrombosis which might extend to the cavernous sinus and produce the same symptoms as lateral sinus thrombosis.

The most frequent location of the abscess was at the inner anterior aspect of the orbit in the region of the lamina papyracea of the ethmoid cells which causes the eye to be pushed outward and somewhat downward.

The next frequent location was in the upper and inner angle of the orbit where the frontal sinus wall was the thinnest, and pushed the eye downward and outward. Either of these, if untreated, might break and leave a fistula above the inner canthus of the eye. When due to maxillary sinus infection, the abscess was in the floor of the orbit and pushed the eye up and outward. Orbital abscess from the posterior ethmoid and sphenoidal sinus were rare, but when they did occur the eye was pushed forward and the pain was severe even in chronic cases.

The symptoms varied greatly, depending upon whether it was acute or chronic, the part and extent of the orbit involved, as well as the nature of the infection. In chronic cases the symptoms were usually mild, a slight pain with tenderness on pressure. There was slight swelling of the lids and conjunctiva. On palpation a firm mass could be felt. The febrile symptoms were usually negative. In acute cases we had a different picture, especially if the abscess were between the periosteum and the extrinsic muscles or in the adipose tissue. There was marked exophthalmos and great swelling of the lids and conjunctiva with inability to close the eye. The pain was severe in the orbit, radiating to the temple. The temperature was usually high, from 100° to 103° F. with a correspondingly rapid pulse. The eyeball was almost immovable and the power of accommodation was lost.

When the abscess burrowed along the periosteum or along the dura of the optic nerve, it entered the extradural space of the skull by way of the optic foramen and produced an extradural abscess which caused an absolute change in symptoms and could easily be diagnosed. The swelling might slightly diminish but the pain was greatly increased and deep seated in the forehead. The tenderness in the

eye might be the same or lessened, but when the skull was firmly compressed over the painful area, the pain was much more marked. The temperature dropped to 96° or 97° no matter if the temperature had been 104°. The temperature lingered around subnormal to 99°. The pulse dropped at times as low as 50. In addition the patient complained of dizziness, especially on stooping. The projectile or cerebral vomiting was always present, and the mental symptoms varied from indifference and slow cerebration to coma. The blood pressure was increased.

In these cases, in addition to opening the abscess one must expose the dura by removing the posterior wall of the frontal sinus and the patient would make an uneventful rapid recovery.

When the toxins entered into the subdural space, the symptoms were those of mild cerebral irritation; whereas, if they entered into the subarachnoid space of the optic nerve, it caused a cerebrospinal meningitis; both of which should be treated with Flexner's or Lederle's antimeningitis serum intraspinally.

As to treatment, an incision was made through the skin over the most prominent portion of the abscess, not necessarily into the abscess, then a small curved blunt artery forceps was inserted into the abscess and withdrawn by opening the forceps. Care should be taken to direct the forceps towards the orbital wall, instead of the optic nerve region, so as not to penetrate the extrinsic muscles or their membranous sheath, as most abscesses were external to these. When the abscess was very large and surrounded the bulb, it was wise to drain it in more than one place.

The great majority of orbital abscesses were due to sinus infections, and in these cases the sinuses should be thoroly drained in addition to the above. Where the abscess was outside of the orbital periosteum and the sinus wall was broken down, an intranasal operation on any of the sinuses was insufficient to relieve the orbital abscess. Ten years ago the speaker was of the opinion that the frontal

sinus or ethmoids had to be opened from the outside. But his experience in intranasal sinus surgery had proved to him that these cases recovered faster with less tendency to recurrence with the intranasal than the external operations.

DISCUSSION.—Dr. Oliver Tydings complimented Dr. Good on the work and illustrations he had presented. He said he had a case under his care at present who was operated upon by a man who was an expert, but the patient was blind in one eye. The history was unique. The patient had some intense pain which the speaker attributed to an eye trouble, an infective condition. Blindness was due to orbital pressure. She never had any pus but had sinus pain; and the sinus was opened on the left side and following that was a mastoiditis. That was operated upon and from what the patient said there must have been a meningitis which lasted for some days, during which time she claimed to have been unconscious. The patient finally recovered from that but still had a suppurating condition. He did a radical mastoid but had not yet finished the nasal work. The operations described by Dr. Good were apparently safe in his hands but, unfortunately, were not always safe in the hands of some others.

In the treatment of these cases he had followed practically in the line laid down by Dr. Good, except in infants. An orbital abscess due to a sinus condition he thought would not be very safe. He had treated most of those cases and he felt that the fact that he knew so much about nose work might account somewhat for the success he had in treating them. He would make both an external and internal incision, starting down through the projecting portion and making an incision through the orbital plate of the ethmoid and down through the nose; a single incision, usually breaking the abscess down with the knife, being careful not to cut any muscular tissue. He had operated quite a large number of cases in that way, in children perhaps less than two years old,

with very good results. He felt that free drainage was worth a great deal in these cases.

Dr. H. H. Lebensohn thought that an orbital abscess was just like one any place else. It made no difference originally where the infection came from, as to what sort of an infection it was. About four years ago a man of seventy developed a large orbital abscess following probing of a stenosis of the lacrimal duct. Within twenty-four hours after the probing he developed an orbital abscess and they found a pure streptococcus culture. It was opened several times, no pus was found, but it finally got to the eye. The same night he had another case and that was a staphylococcus infection. It was opened and drained and within a week or ten days the patient got well.

In a patient who had recently been discharged, a boy of eighteen, he could not make a diagnosis as to the etiology. It looked like an ethmoid infection with an almost pure pneumococci culture. He drained the abscess and when it was opened he got between three and four drams of pus. He kept on ethyl hydrochlorat with little strips of gauze and it cleared up remarkably well. He thought it was not so much the opening, but advised opening them as soon as possible. He thought the prognosis would depend upon what the infection was. The staphylococci infections have a good prognosis, the pneumococci and streptococci bad.

Dr. R. H. Good, in closing, agreed with Dr. Tydings that establishing a perfect drainage was the best treatment.

In cases of suspected ethmoid infection instead of spending so much time in finding out the nature of the infection bacteriologically, it was a better plan to take a stereoroentgenogram and find out the nature of the condition at once.

Embolism of Central Retinal Artery as a Complication of Influenza.

Dr. Michael Goldenburg exhibited a case of this kind. Mrs. E., aet. 22,

married, one child. Had always been in good health. On November 20th, 1918, during the virulent epidemic of influenza, she developed this disease, passing through the usual stages, a very sick individual. On about the eighth day, when her temperature was at its highest point, she suddenly felt something had happened to her right eye; then noted that she was blind in that eye; and further states that the eye felt stiff and was wild looking; and later the eye deviated outward. I should judge from her description that the pupil was widely dilated.

On February 12, 1919, she presented herself to our clinic at "The Illinois Charitable Eye and Ear Infirmary."

Examination: Lids, conjunctiva, cornea and anterior chamber negative. Pupils equal and react to light. Vision, Right: Fingers at two feet and then only in the upper temporal field. Left: 20/20-3.

Fundus, Right: Disc primary optic atrophy, cloudy grayish pink area about two disc diameters noted from disc temporalward beyond macular region. All arteries markedly diminished in calibre, except upper temporal branch which is about half the normal in diameter. Branches running nasalward very thin and end in white lines. Many small hemorrhages in region of macula and on nasal side both superficial and deep. Directly over bifurcation of artery a small grayish dot is noted that I was inclined to think was in the vessel, but could not be positive; other observers would make no definite statement upon that fact.

Left: fundus and media negative.

General physical examination, made by a competent internist disclosed the following: Heart negative. Aortic second sound slightly accentuated, which speaks against a valvular lesion. Lungs: not quite healed. In right upper part of lung still some consolidation that could be tubercular, but most likely an unresolved area. Blood pressure: 120. Urine: Negative.

ABSTRACTS

Fromaget, C. and H. Functional Anisocoria. Archives d'Ophthalmologie, v. 36, p. 277.

Functional anisocoria is a clinical syndrome without organic lesion, due to an instability of the supranuclear center which coordinates the pupillary movements. This definition is analogous to that obtaining for functional strabismus or nystagmus, and it was the study of these latter two that led the authors to study the former and to seek an explanation for the many cases of anisocoria of obscure origin which presented no organic, ocular, nervous, cervical, mediastinal, or other lesion, with preservation of the essential iridic functions.

Observation 1. C—, aged 30, was subjected, on account of his unsatisfactory conduct while under fire, to a medicolegal examination, which, altho thoro and extending over a fortnight, revealed nothing. There was no strabismus, either manifest or latent, and the pupils were equal, regular, and responded to all stimuli. Vision of R. and L. = 6/6, no correction accepted. He was, therefore, notified that he was to be returned to the front. Twelve hours later he complained of blurred vision; his vision was still normal, but a mild transient, alternating strabismus was noticed. Pupils were equal and reacted normally. On the following day the strabismus was more pronounced, and transient inequality of the pupils appeared. Two days later the strabismus was confined to the right eye, and when the object fixed was five meters distant the secondary deviation was equal to the primary, 15°; whereas at 20 centimeters distance, no strabismus could be demonstrated. At the same time the inequality of the pupils became very evident, the right pupil measuring 5 mm., and the left pupil 3.5 mm. in ordinary light, with the eyes fixed on an object in middle distance. The pupils still react well to direct and indirect illumination, but feebly on convergence. Cocain dilates both pupils without causing them to

become quite equal. The subjective symptoms are not marked; the patient reads with ease and finds his way about the room without hesitation. Bandaging the right eye for twenty-four hours brought about a complete disappearance of the anisocoria and a marked diminution of the strabismus, but the pupils still remained immobile on convergence. A short time after the removal of the bandage the anisocoria reappeared and the strabismus increased. Bandaging the left eye for forty-eight hours gave the same result. Instillation of atropin for three days caused a still greater diminution of the convergence and elicited a hypermetropia of 1. 5 D. When the effect of atropin had worn off a small amount of strabismus remained, and the refraction again simulated emmetropia; a feeble reaction of the pupils on convergence was present.

Again the nervous system was gone over without yielding any diagnostic point. The spinal fluid was clear, the Wassermann reaction of the spinal fluid and of the blood was negative. Radiographic examination of neck and mediastinum were also negative. A psychiatric examination gave the following: Emotional psycho-neurosis, with psychic, senso-motor sensitive-motor, and splanchnic manifestations. The patient was placed on sedative treatment, both mental and physical, with complete disappearance of all his symptoms, after being under observation for a period of three months. He had been assured that his trouble would disappear completely, and his physical improvement kept pace with his mental amelioration.

The authors call attention to the parallelism existing between functional anisocoria and functional strabismus. This functional inequality of the pupils develops in eyes in which the intrinsic motor apparatus is intact and the iridic functions normal. It arises and persists under the domination of the same occasional factors as functional strabismus. The question arises, are these

phenomena manifestations of hysteria, or, to employ a better term, of pithiatism (*pithiatism*—a state of mind which renders the patient subject to persuasion; a term proposed by Babinski as an equivalent of hysteria)? The symptoms presented by C— do not remind one of the ocular stigmata of the Charcot school, but they fit well into the picture of Babinski's pithiatism. Two successive emotional disturbances produced the condition: first the shock on the battlefield; secondly, the threat of being sent back to the firing line.

The ocular symptoms are, up to a certain point, capable of being produced voluntarily. Voluntary strabismus is well known, and, if we are not in a position to speak of voluntary anisocoria, the intimate relation existing between the two phenomena allows us to connect them pathogenetically and to claim that in C— they were manifestations of a mind more or less blunted. Thus the anisocoria might be the result of an unconscious associated movement accompanying a voluntary movement. We cannot positively exclude malingering, as the differentiation of malingering and pithiatism is always difficult. Nevertheless, the production of the phenomena described can take place only in a vitiated, disequibrated subject.

The role of the supranuclear functional centers which coordinate the extrinsic movements of the eyeballs is well known both in its normal and pathologic modalities. We know that strabismus and nystagmus are the visible manifestations of the disequilibrium of these centers, generally brought about by secondary causes, ocular or other, and we must be careful not to confound them with pseudostrabotic deviations or nystagmiform oscillations, paralytic or spasmodic, with an organic base. The coordination of the agents of intrinsic ocular motility has received less attention. Nevertheless, the fact that in most people the pupils have the same diameter in spite of uneven illumination of the two eyes proves that this function of pupillary equality does exist; and, furthermore, the fact that with a given in-

tensity of illumination the pupils vary with the accommodation, and convergence evidences the intimate relations existing between the coordinating center for the muscles of the pupil, the accommodation, and the extrinsic muscles. The persistence of equal pupils in many strabotics, in anopia, and in anisometropia, proves the relative autonomy of the pupillary coordinating function. The anatomic location of this pupillary center is hypothetical; physiologically it is superior to the nuclei of the oculomotorius, which are executive agents, and it is closely associated with the coordinating centers of the extrinsic muscles. It is inferior to the voluntary and reflex centers.

The tonic center of the conjugate pupillary movements, aside from the lateral connections (center of lateral movements, center of convergence, supranuclear center of accommodation) is found bordering on numerous centripetal paths, visual, auditory, vascular, cerebral, kinesthetic, etc. The executive agents are the dilators and sphincters of the pupils. The relation is maintained by the common oculomotor and the sympathetic system. A lesion situate anywhere along the centrifugal part of the system will provoke an organic anisocoria of the known paralytic or spasmodic type; a lesion or irritation at any point of the centripetal system or of the lateral connections will not provoke an anisocoria, providing that the coordinating center displays sufficient activity. If the center is miopragic (underfunctioning) these secondary causes may determine an inequality of the pupils. Functional insufficiency is the basal cause, and this fact justifies the use of the term which we have adopted of "functional anisocoria," in analogy to the term "functional strabismus," in both conditions disequilibrium of the neighboring centers being present.

An understanding of the lateral and afferent connections of the pupillary center will serve to explain the secondary types grafted on functional anisocoria to produce the various clinical modalities. When an underfunctioning pupillary center comes under the

domination of a coordinating center of convergence which is disequibrated we shall have synchronism of functional anisocoria with functional strabismus, as in our patient C—.

Observation 2. In an aviator aged 22, with negative history, except that of a convergence of the left eye of 15° dating from childhood, and with vision of 6/6 in either eye, the pupil of the left eye was constantly smaller than that of the right eye. This inequality of the pupils in no way interfered with the voluntary or reflex reaction of the iris. Examination of the nervous cerebral, and sympathetic system, radiographic examination of the mediastinum, Wassermann reaction of the blood, all negative. Here again, we see the disequilibrium of the center of convergence entailing a disequilibrium of the neighboring pupillary center. This condition, altho it arose early in life, is not entitled to the name of congenital anisocoria or congenital strabismus.

The association may be a little looser; the anisocoria may outstrip the disequilibrium of the centers of the extrinsic motors, so that the anisocoria is permanent while the strabismus is latent, thus giving, on superficial examination a picture of true physiologic anisocoria, or of the congenital type mentioned by certain authors. The use of a screen will quickly reveal the true state of affairs by converting the latent into manifest strabismus.

The possible occurrence of a triad of symptoms: strabismus, nystagmus and anisocoria is shown here.

Observation 6. R—, aged 24, with 0.3 in the right and 0.1 in the left eye after correction, shows concomitant internal strabismus of the left eye; permanent horizontal nystagmus with slow, narrow oscillations when binocular vision is used, and quick wide oscillations when monocular vision is employed. Unequal pupils under all conditions; under candle light in a dark room the right pupil measures 4 mm., the left 5 mm. Reaction to light well marked on both sides, and good to convergence. Besides there is hippus with wide oscillations. Thus we see that

anisometropia will produce anisocoria in subjects in whom the pupillary coordinating center is below par under the same conditions under which a convergent or a divergent strabismus is due to an occasional ametropia. This brings us to the much debated question of unequal pupils due to anisometropia; while some writers deny the existence of an anisocoria of this type, others maintain that it exists, and still others see in it either a physiologic anisocoria, or a congenital morphologic or structural anisocoria. The authors believe that uncomplicated anisometropia is unable to produce anisocoria any more than it can produce strabismus, unless there be some profound anomaly of the centers of coordination, be it of the internal or of the external motor apparatus of the globes. There must be some, however slight, defect of the nervous function. Stimuli may be transmitted from a distance through the connections of the pupillary coordinating center. The influence of the cerebrum, more or less consciously arising, is seen in the case of C. Amongst the sensorial stimuli the most important are those of the visual order. In otherwise normal subjects the greatest variations of illumination will not give rise to pupillary inequality; in subjects under the domination of anisocoria the smallest variation in illumination or the slightest macular lesion will precipitate the functional syndrome. As Roche says: "In lesions of the chorio-retina situate at or near the posterior pole, the pupils are uneven, the pupil of the affected eye being the wider. This anisocoria is always of low degree and the pupillary motility remains intact." The authors think it would be more logical to assume a latent disequilibrium of the coordinating centers of the pupils, the anisocoria becoming manifest when the retinal sensorial inequality precipitates it, just as in eyes which become strabotic late in life through a tardy amblyopia, or as nystagmus appears after the loss of binocular vision.

Again, we meet equal pupils in subjects with severe optic or retinal lesions. In these cases the center of

equilibration is doing the work that was cut out for it. A nurse aged 25, whose left eye had suffered a contusion without visible rupture of the tunics, underwent a reduction of vision in the injured eye until a mere perception of light remained. No response to direct light stimuli, but perfect response to indirect light stimuli and to convergence. The pupils were even at all times.

In conclusion the authors draw attention to a form of anisocoria which they style "matutinal functional anisocoria." This form appears in individuals who have been educated to autoobservation. It comes on after awakening, and is very intense for fifteen to twenty minutes. In spite of its intensity it is highly transitory and disappears after ocular movements or reading. It cannot be provoked by artificial differences of retinal excitation, nor does it lead to any definite new trouble. The iridic functions are perfect.

M. W. F.

Berner, O. A Case of Sarcoma of the Iris. Norsk Magazin for Laegevidenskab. v. 79. No. 12.

The writer presents the clinical and microscopic findings of a case of sarcoma of the iris and gives his theories as to the development of these tumors. The patient was a woman of 37 years of age who presented herself on account of a sudden dimness of the vision of the left eye which however had disappeared over night. The writer explains this symptom by supposing a possible hemorrhage from the tumor into the anterior chamber.

Clinical examination showed a lens-shaped almost round elevation of the iris of about 2.5 mm., diameter at the pupillary margin below in the left eye. It was heavily pigmented, dark brown, while the general color of the iris was bluish gray. The iris had besides small brown spots thruout. The patient stated that she had always had a brown spot below the pupil. No vascularization could be made out even with a strong loupe nor could any adhesions to the lens be found. Transillumination of the ciliary region was

negative. There was no conjunctival injection, media were clear, fundus negative, and no increase in tension.

A complete iridectomy downward was done. The microscopic picture showed a marked cellular proliferation in the stroma of the iris, especially at the pupillary edge, characterized by small, dark, evensized spindle-shaped nuclei. A few sections showed typical giant cells, but in none could any polynuclear leucocytes be found. Pigment cells of two types were very numerous in some sections, the first type a large round cell so heavily pigmented that the nucleus was obscured, the other a smaller cell with a variable amount of pigment. By using Alfieri's method of removing the pigment a differentiation between the retinal and stroma pigment cells was obtained. The author also convinced himself of the presence of "Klumpzellen" in the stroma. All in all the microscopic appearance reminded one very much of that from Casey Wood and Brown Pusey's case.

The author discusses at some length the theories as to development of sarcoma of the iris. Other writers have traced a relationship between the pigmented spots of the iris and sarcoma. It has been pointed out that these pigmented spots are separate and distinct from the regular coloring of the iris. In structure these pigment spots consist of so-called "Klumpzellen," large round cells very heavily pigmented; and differ markedly from the small pigment cells of stroma of the iris. He believes that these "Klumpzellen" are really retinal cells detached during embryonic growth and pushed into the stroma layer.

In support of this theory he points out that these cells are most numerous in the posterior region of the iris and also at the pupillary border at which latter place he assumes they are detached at the same time as the retinal cells which go to form the muscle of the sphincter of the pupil. The stroma cells are of mesodermic, while the retinal are of ectodermic origin and hence these pigmented spots which are supposed to give rise to malignant growths

are epithelial in character. This theory may explain the fact that sarcoma of the iris in distinction from other sarcomas, appears mostly in middle life, around the age of 40, and also that this tumor has a predilection for the lower half of the iris, a phenomenon formerly thought entirely accidental, but now assuming some significance in relation to the location of the choroidal fissure.

The iridectomy was done in August, 1916. In April, 1918, no recurrence had taken place.

D. L. TILDERQUIST.

Young, George. Threshold Tests. *British Journal of Ophthalmology*, July and August, 1918, p. 384 and 430

The writer calls attention to the fact that altho the probable diagnostic importance of the determination of the approximate thresholds for light differences and colors has been pointed out, very little accurate knowledge in this field has been worked up; he suggests that investigations of the subject should be undertaken and notes compared; he offers a rapid and accurate procedure which can be employed by the busiest workers.

The test objects consist of pieces of white blotting paper upon which are produced spots of black, red, green, blue and yellow in dilutions equalling $1/512$, $1/256$, $1/128$, $1/64$, $1/32$, $1/16$, $1/8$, $1/4$, $1/2$ and I, each successive spot being double the intensity of the previous one; for pigments the Windsor and Newton's waterproof inks commercially known as India ink, vermilion, emerald, ultramarine, and yellow are used, the dilutions made in distilled water, and dropped from a pipette of 1 mm. drop surface, from a height of 100 mm. Fifty cards are fastened in the above order both of color and dilution, on each grey page of a photograph album and the value of each card noted in a corner.

The patient must sit so that a good source of daylight strikes the pages of the album obliquely, coming from behind and one side, and the cards are successively presented in the above order before each eye separately, one card at a time. At each card the sur-

geon asks: "blank or spot?" The black series coming first, gives a rapid clue in cases where the light sense is diminished. The palest black spot recognized is noted as the nearest to the threshold for differences of light intensity. Where this threshold is at fault with no scotoma, those who have a good photometer should use it and help decide whether the light threshold is also at fault in all cases. If this is the case—and Young thinks there is little doubt about it—the test with the black series becomes a direct test of the light sense.

With the color series the same process is performed until the patient answers "spot," when the surgeon must immediately say: "any color?" The palest spot evoking a color sensation, though misnamed, is noted as the nearest to the threshold for that color. In testing for red and green it is often a good plan, after having exposed each card successively on two opposing pages, and no color has been perceived, to uncover both, testing for scotoma.

Young finds the threshold for light differences and that for color coincide invariably, as has been pointed out, but they often vary for the other colors, and "spot" is announced one or two cards before color sensation is evoked; he believes there is little doubt that these color thresholds will frequently prove to be the only pathologic sign, when color vision and field are normal.

A fairly large number of observations shows the following averages in normal eyes, seldom varying to any marked degree: black, $1/512$; red, $1/256$; green, $1/32$; blue, $1/512$; yellow, $1/256$. With both eyes exposed the thresholds are about twice as keen; ordinary variations of daylight do not matter; reflections interfere and consequently the light should be well chosen and uniformly adhered to; ordinary artificial lights should be avoided tho electric light with suitable bulbs may prove satisfactory.

Rapidity is not only possible, but essential, especially where the color dots are concerned, in order to avoid the element of afterimages creeping in, with the confusion that would re-

sult. To go thru each set rapidly and urge the patient to prompt attention and quick reply, and to pause between each set while noting the number, will eliminate the complication. After very little use, the album test does not take two minutes.

The writer adds a table giving a number of clinical examples which, although too scanty to draw conclusions, are often striking. Thus in a case of hemorrhagic retinitis, yellow is not seen until saturated, while in an example of disseminated choroiditis this color is seen with 1/256 dilution. Interesting also is the reduced light sense, as compared with the color sense, in three examples of glaucoma and the reverse condition in two instances of optic nerve atrophy in which the light sense is only affected very late. Tobacco amblyopia is diagnosed with great rapidity with the red and green cards, the patient at once seeing the color on the opposite page, while missing it on the one he is looking at.

C. H. M.

Macphail, James N.—Importance of Some Minor Eye Operations. (Indian Medical Gazette, June, 1918.) This is an address delivered at the Bengal Branch of the Medical Missionary Association of India. The writer has had a very large experience of eye work in India, and in this paper makes a few remarks about eye operations in general. Speaking of tattooing the cornea and the puncturing of thin scars that sometimes occur, he says that if proper antiseptic precautions have been taken it may do good by relieving tension and preventing the formation of a staphylocoma.

Trachoma calls for operative treatment usually. Expression converts a chronic into an acute condition, which is more amenable to treatment. After expression he applies a one per cent solution of corrosive sublimate to the new surface, following Treacher Collins' method. Entropion he treats by splitting the lid and removing a wedge of skin from the skin surface of the lid. Grafting is not done apparently.

Iridectomy Mr. Macphail thinks the operation for acute glaucoma, and he is inclined to doubt if a glaucoma that is not benefited by iridectomy will benefit by another operation. His experience is that any operation in chronic glaucoma is unsatisfactory. When patients come with a ripe cataract in one eye, he extracts it; and at the same time does a preliminary iridectomy in the other eye. He would do this in all cases if he could.

F. P. M.

Musy, T. Tuberculosis of the Conjunctiva Caused by a Bacillus of the Bovine Type. (Ann. d'Ocul., Mar., 1918, Vol. CLV, p. 144.) A case of tuberculosis of the conjunctiva resembling Parinaud's conjunctivitis was described in 1914. It was not possible at that time to say whether the germ was of the human or bovine type. But by making use of the fact that human tuberculosis produces in cattle only localized infection, at the point of inoculation, while the bovine type rapidly develops into a generalized tuberculosis, the author was able to demonstrate that the germs in his case were of the bovine type.

C. L.

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LESSONS FROM SCLERAL TREPHINING.

The report by Dr. A. E. Ewing of a case subjected to postciliary scleral trephining for acute glaucoma, (*Jour. A. M. A.*, Dec. 14, 1918), is interesting not only from the operative point of view, but more especially from that of the physiopathology of glaucoma.

The patient, a woman 57 years old, had in the right eye the visual field confined to the temporal side, and very much restricted. Tension with Schiötz tonometer equalled 57 mm. Hg., Vision, 8/150. Myotics failing to control the disease, a postciliary scleral trephining was performed, in the upper temporal portion of the eye. After dissecting a conjunctival flap down to the sclera, a 2 mm. trephine was applied and a hole made in the sclera alone, leaving the choroid intact. The conjunctival flap was then replaced and sutured.

There was no appreciable reduction in the tension following the operation, as determined by palpation. Forty-eight hours later the globe was quiet

and the cornea clear, but vision was reduced to counting fingers at one foot. During the following four weeks, with the aid of eserin, vision rose to 20/60, but there was marked protrusion of the conjunctiva over the wound. The opening in the sclera could readily be seen through the conjunctiva and shown to be clear by transmitted light.

Three weeks later, the tension had risen to 60 mm. Hg., and vision lowered to 20/120. The protrusion on the conjunctiva was excised, showing a dense fibrous tissue which blocked the aperture. After removing it, the choroid was slit open and from the incision three large drops of vitreous escaped leaving the globe very soft. V = fingers.

One week after this second operation tension was only 9 mm. Vision rose to 20/240. Within a month tension rose to 51 mm., and vision lowered to motion of the hand at six inches. With the use of eserin the media cleared and V = 20/250. A marked protrusion of the conjunctiva was again noticed on the wound, which being incised al-

lowed a free flow of aqueous, but no vitreous, and tension was reduced to below normal. Three days afterward the patient was very uncomfortable, the eye being hard and the fundus blurred. The conjunctiva distended; incision gave immediate relief, the sight rising and the media clearing. Three days after the puncture the patient felt severe pain. A new incision produced a free discharge of aqueous, but no vitreous, and immediate relief from pain. Scleral trephining in the same place revealed a new fibrous scar, a free escape of aqueous, no vitreous, was produced; tension lowered to normal and vision rose. But the same symptoms recurred.

Three months later trephining was performed on a fresh spot of the sclera. Finally the sight was lost entirely, and tension rose to 70 mm.; but the eye was quiet and comfortable.

The conclusions which can be drawn from this case are: 1st. That scleral trephining as an operation for the relief of subacute glaucoma, even with slitting of the choroid, is entirely useless, because the wound is rapidly closed by newly formed fibrous tissue, which interferes with the proper drainage of the eye. 2d. The cloudiness of the cornea and vitreous, and the arterial pulsation, can be instantly relieved by drainage from the vitreous, with immediate restoration of the sight. 3d. The loss of vitreous even in such quantity as to leave the eye very soft, is no more cure for glaucoma than is the removal of the lens. 4th. A drainage of the aqueous can be established from the anterior part of the eye through the vitreous and below the conjunctiva.

It is an established fact that the vitreous is never reproduced, its loss being always compensated by a quantity of aqueous which takes its place. For that reason it is not unusual in our opinion, that no vitreous escaped after the incisions of the conjunctiva and choroid. What makes this case interesting is the striking fact that glaucomatous symptoms were always produced when the aqueous accumulated in the eye, notwithstanding the small quantity of vitreous left. This proves

that in glaucoma the secretion of the aqueous is not stopped, even when the intraocular pressure is very high, and also that when the anterior outlet is closed it accumulates in the vitreous sponge, and equalizes the pressure all over the eye, escaping freely when an artificial outlet is produced either forward or behind the equator.

It is to be regretted that Dr. Ewing had not made the chemical analysis of the aqueous which escaped after his numerous operations, with the object of ascertaining whether the composition was changed, and if a greater quantity of colloids, albumin, etc., existed. A fact which points to this altered composition is, that the media always cleared to a great extent when the eyeball was punctured.

M. URIBE-TRONCOSO.

WAR OPHTHALMOLOGY

The phrase, "War Ophthalmology," and its equivalents are used to indicate certain aspects of ophthalmic science and art, that have been rapidly developed or emphasized by war. The literature of the war period has been very largely devoted to ocular injuries, certain forms of which have been relatively very frequent. Yet the eye remaining unchanged, its reaction to external force is very much the same as in times of peace. Looking backward we can surmise from present experience, what took place in former wars; and for the future, the lessons now learned will have permanent value, and will be applicable in an era of peace.

The continuity of war ophthalmology thru successive ages has been treated by our ophthalmic colleague, Dr. James A. Spalding, in his presidential address on "The Eyes in War," published in the *Journal of the Maine Medical Association* for March, 1919. He says "In the beginning of the world, savages fought for similar reasons, and met with just that same sort of injuries around the eyes as are seen today, amongst savages hardly yet more civilized than our remote ancestors." With different weapons and

methods of attack, very much the same damage has been done to the combatants.

Again, as Dr. Spalding points out, the value of the eye, even a single eye, to the warrior, has been recognized in legend and history, in tapestry, and painting. The eyes of the fabled Argus are a prophecy of the modern army with its observation service. It is extremely interesting to trace, as Dr. Wood has done (p. 220 of this volume) and as Dr. Spalding does in his address, the history of the eye in previous wars.

Dr. Spalding cites Baron Larrey with regard to the Napoleonic wars. His own study of eye injuries during the American Revolution and the War of 1812 reveals nothing more serious than burns of the eyelids and eye from flashings of powder from old-fashioned flintlock muskets or from bits of flint itself." In the American Civil War, the number of cases of sympathetic ophthalmia was notable. Many eyes were injured by buckshot, and shell explosions began to figure as an important cause.

In the Franco-Prussian War of 1870 ophthalmology was recognized as a special branch of surgery. "Soldiers with eye injuries were for the first time carried to the rear and put in charge of ophthalmic surgeons. The left eye was hit more often than the right, due, as was surmized, to the better protection furnished to the right eye by the butt of the rifle. It was now observed that if an eye suppurated after an injury, it was much less likely to induce sympathetic ophthalmia than if insidiously inflamed. Sutures were also now first utilized for sewing over extensive injuries of the sclera, and with unlooked-for good results, many an enucleation being thus avoided. A man of whom I lately heard, lost the sight of an eye totally, the bullet lodging in the orbit and only being removed at death, thirty years later. In another instance, a soldier was hit in the right eye, without apparent injury, but could afterward 'see but half of objects with this eye.' Dynamite and gun cotton explosive injuries were studied, and strychnia util-

ized hypodermically for optic atrophy following concussions without material injuries. Much was said of the early or late operations for traumatic cataract, and first aid bandages, covered with aseptic ointments, for protecting orbital, eyelid, or other injuries, were utilized in military surgery at this time."

Dr. Spalding goes still more extensively into the lessons that have been learned since 1914, and especially the limitations of the value of our usual tests for visual acuity, color vision, and the equilibrium of aviators. He also takes up the reeducation and provision for the war-blinded.

His interesting address fully establishes the claim thus expressed, "Without detailing a hundredth part of all that might be said concerning the eyes in war, let me here reiterate the main idea of this paper that from time immemorial the eyes have been injured in quarrels of all sorts, and that as such injuries occurred, methods of defense were invented. In spite, however, of all that we can do, injuries will occur; so that the study of their cure will forever be worth the efforts of the keenest minds in medicine."

E. J.

OPHTHALMIC EXAMINATIONS.

The American Board for Ophthalmic Examinations will hold its next examination at the Wills Eye Hospital, Philadelphia, 3 P. M., Friday, June 6, 1919.

This examination will be the fifth to be conducted by the Board. The Board is composed of representatives of the American Ophthalmological Society, the Section on Ophthalmology of the American Medical Association, and the Academy of Ophthalmology and Otolaryngology. By arrangement with the American College of Surgeons, the Board has become the Ophthalmic Credentials Committee of the College, and conducts the examinations of the ophthalmic candidates for Fellowship in the College.

For a certificate of this Board, the examination in ophthalmology consists of first, case records; second, written

examinations; and third, clinical laboratory and oral examinations, or so much thereof as may be adjudged necessary:

(a.) Candidates in ophthalmology are required to submit twenty-five complete case records of which not more than ten should be descriptive of operations. These records should be of cases of ocular diseases and defects of varied character, including errors of refraction or muscle balance; external ocular diseases or diseases of the uveal tract or retina, or of the optic nerve, or glaucoma. The reports should show especially the reasons for the diagnosis, and for the operative treatment and the technic of operations in operative cases.

(b.) The written examination will test the candidate's knowledge of the underlying principles of the science of ophthalmology, including anatomy, embryology, physiology, physiologic optics, pathology, relations of the eye to the other organs and diseases of the body.

(c.) The oral examination will include: The external examination of the eye. Ophthalmoscopy (candidates are requested to bring their own ophthalmoscopes). Measurement of errors of refraction. Testing of the ocular movements and fields of vision. Relations of ocular conditions to diseases of other parts of the body and their treatment. Laboratory examination in histology, pathology, and bacteriology of the eye.

Further information may be had upon request from the Secretary, Dr. William H. Wilder, 122 South Michigan Avenue, Chicago, Illinois.

SOCIETY MEETINGS.

The annual meeting of the Ophthalmological Society of the United Kingdom, Great Britain and Ireland was held this year, May 1-3.

The Société Française d'Ophthalmologie resumed its series of annual meetings at Paris, May 5th. Dr. F. Terrien made the report on the special subject for discussion on X-Ray and Radium in Ophthalmology.

The following meetings will be held: Section on Ophthalmology, American Medical Association, Atlantic City, New Jersey, June 9-13.

American Ophthalmological Society, Atlantic City, New Jersey, June 13-17.

Oxford Ophthalmological Congress, Oxford, England, July 10-12.

Pacific Coast Oto-Ophthalmic Society, San Francisco, California, August 4-6.

The Colorado Congress to be held August 4th and 5th will this year include both ophthalmic and oto-laryngologic papers and discussions.

American Academy of Ophthalmology and Oto-Laryngology, Cleveland, Ohio, September 1-3.

BOOK NOTICES.

Atlas of Military Ophthalmology (Atlas der Kriegaugenheilkunde samt begleitendem Text), by **Prof. A. von Szily**, Freiburg, i. Br.; large 8vo.; pp. 195-354, 2d part; plates XVI to XLVII. F. Enke, Stuttgart, 1917; also numerous black and white illustrations in the text; 20 marks.

This is the second of the proposed three sections of von Szily's Atlas, the first one having been published early in 1917, reaching this country some six months ago. The final one advertised for issue also during 1917 has not yet appeared.

The text of the first part of this excellently planned monograph is divided into four chapters; the present part carries the work to the eleventh chapter.

The fifth chapter is concerned with gross lesions of the eye associated, of necessity, with other extensive wounds. Two of the accompaniments of these large traumatisms are enophthalmus and exophthalmus, a subject begun in the first part of the Atlas and ended in the second. Shrapnel wounds of the face, of the walls of the neighboring cavities and of the skull (with ocular injuries), are the commonest examples. These are well illustrated in the text and the treatment—especially in the surgical conduct of the cases—

is fully outlined. One of the outstanding attractions of the chapter is a description of the fundus appearance in several cases of gross injury, which are well reproduced in color.

The pulsating form of traumatic exophthalmus is extensively described and its incidence compared with the experience of the Russo-Japanese War and with civilian occurrences.

Chapter seven deals with metastatic ophthalmia in the war. Von Szily's experience is much the same as that of British and French observers; in spite of conditions supposed to favor the production of this distressing complication, it has been one of the most uncommon sequels of systemic poisoning. Four cases, each with a complete history and histologic report, are given which do not, however, differ essentially from the well known picture of the disease depicted in our text books—the panophthalmitis of pyemia. It may be added that, as in civil life, the double sided ocular metastases, of whatever origin ended almost invariably in the death of the patient.

Axial wounds (*Durchschüsse*) are naturally found in infantry organizations and consist largely of bullet wounds, but not infrequently the thru-and-thru penetration is the result of shrapnel. Most of these traumas in survivors are lateral or oblique; antero-posterior shots penetrate the brain and cause almost instant death. In these cases it is of course the fundus changes that interest one and the reproduction of the background alterations, altho in the Atlas too highly colored, are admirable. It is remarkable to note the successful efforts made by nature under aseptic conditions, to close the wound by extensive cicatrization, and how well these are shown by the ophthalmoscope.

In this chapter is also shown by numerous diagrams, the narrow escapes (except by neighborhood shock), the eyeball suffers in engagements where the whole atmosphere seems charged with flying bullets. These missiles enter and leave the orbit at all possible

angles, sometimes without any permanent injury to eyesight.

The eighth chapter is devoted to bilateral injuries of the globe, mostly from shrapnel.

Chapter nine deals with the war blind (due to wounds) in general. These are (practically) all the result of serious bilateral injuries. Oguchi found 53 such cases in a total of 3,781 ocular injuries in the Russo-Japanese war. Probably the proportion will be about the same in this great conflict, but complete German-Austrian figures are not yet available.

The next chapter deals with perforating wounds of the eye and with foreign bodies in the globe, especially in relation to infection and sympathetic ophthalmitis. Here again the Allied experience is duplicated. Probably owing to early treatment and to the fact that most of the missiles are aseptic, sympathetic disease has been exceedingly rare, probably more uncommon than in any previous war. When it did occur the picture presented is the classic picture familiar to our readers.

We look forward with interest to the final volume of this valuable series.

C. A. W.

The third part of this work containing pages 355 to 590 and giving the last six chapters, has just been received in this country. It reports a summary of the ophthalmic observations and therapeutic procedures for war injuries at the Freiburg clinic up to the spring of 1916, with a brief appreciation of it by "Herr Geheimrath Professor Dr. Th. Axenfeld."

The scope of the work is shown by the subjects of the different chapters, which are I, Cranial Shot-wounds and the Eye; II, Temporal Orbit Wounds; III, War Hemianopsia; IV, Penetrating Wounds of the Orbit and Vicinity; V, Lesions from Shot with Great Destroying Ability; VI, Metastatic Ophthalmia after War Wounds; VII, Penetrating Wounds, with Ophthalmoscopic and Histologic Findings of Chorioretinitis Proliferans and Atrophy; VIII, Bilateral Wounds; IX, Blindness Produced by Warfare; X,

Perforating Wounds of the Eyeball, Intraocular Foreign Bodies and Infections; XI, Macular Changes, Contour Shot Wounds, Contusion and Aerial Shot Wounds; XII, Effects of Gassing, Wounds and Burns from Gassing, Gas Grenades, Fire Bombs, Pistols for Flashing Light, etc.; XIII, Organic Lesions of Mobility and Sensibility with Remarks on the Psychognostic Reduction of Function in Skull Wounds; XIV, Psychogenic War Neuroses; XV, Wounds of the Nasal Sinuses and the Tear Duct; XVI, Plastic Operations in War Wounds.

Each chapter is accompanied by an extended bibliography; and excellent indexes of topics and authors mentioned are appended. The well known talent of von Szily for detailed description is nowhere more appropriately applied than to the description of the clinical characters of ocular injuries.

The mechanical execution of this work is fully up to the standards attained in Germany before the war. The paper is about twice as heavy as that used in this journal; and is highly finished to take perfectly half tone reproductions and color printing.

The whole appearance of the work, with its costly paper and wide margins, is strongly in contrast with the economies forced on the scientific publications of allied countries during the later years of the war.

The hope expressed by Axenfeld, June, 1916, that "this work will be an evidence of our activity in this great time," might apply more widely than as a mere record of the work of the Freiburg clinic.

The last two chapters, illustrated by 130 half-tone pictures of cases, given as they appeared after injury, with results of the "activities" that repaired these deformities, are a hint of the activities that produced them.

E. J.

Transactions of the American Academy of Ophthalmology and Otolaryngology, 1917-1918. 8vo, 606 pages, 1 colored plate, 111 illustrations. Published by the Academy.

Owing to obstacles and delays due

to the war, when the twenty-third annual meeting of the Academy was held in Denver, last August, the printing of the proceedings of the Pittsburgh meeting, held over nine months before, had not been completed. It was therefore natural to combine the proceedings for the two years in a single volume.

This makes the largest volume of Transactions that the Academy has yet issued; altho each year it was suggested that the annual meeting be omitted because of the difficulties of securing papers for the program. We believe that in scientific value the papers here published will compare favorably with those in any of the preceding volumes.

The part of the volume relating to ophthalmology includes 350 pages. Most of the papers here printed have already appeared in the journals, some of them from the last meeting in the AMERICAN JOURNAL OF OPHTHALMOLOGY. In general form and makeup the volume corresponds closely to its immediate predecessors.

E. J.

CORRESPONDENCE.

The Electric Ophthalmoscope Mirror. *To the Editor:*

In the discussion of the article "An Improved System of Illumination for the Electric Ophthalmoscope," by Dr. Carl Koller in the 1918 volume of the Transactions of the American Ophthalmological Society, the reader of the paper states that "the illuminating system used in the instrument sold as the 'May Ophthalmoscope' is the one that was worked out by myself and Mr. R. H. Wappler;" he claims that he has used a similar instrument in his office since 1911 or 1912, and he seems, apparently, to imply that I obtained some of the ideas embodied in my instrument from him or Mr. R. H. Wappler.

I wish to state emphatically that I owe nothing either to Dr. Koller or to Mr. R. H. Wappler in connection with this instrument.

I exhibited and described this ophthalmoscope at the meeting of the

American Ophthalmological Society in 1913, at the meeting of the Ophthalmological Section of the American Medical Association in 1914, at the December, 1914, meeting of the Ophthalmological Section of the New York Academy of Medicine, and at a meeting of the Metropolitan Medical Society of New York in 1913 or 1914. Surely these meetings ought to have given the reader of the paper referred to excellent and abundant opportunity for presenting his claims four years ago.

In 1912, tired of replacing broken mirrors in the electric ophthalmoscopes then on the market, I worked out a model, the essential feature of which was a solid piece of glass which acted as a mirror and was unbreakable. I made my model myself, even to the grinding of the reflecting prism; this model was given to the Wappler Electric Co. as a pattern.

I am not concerned and do not care about priority; if this were the only question involved I would not take up your space in replying to Dr. Koller's insinuations. When Dennett brought out his electric ophthalmoscope, with its basic innovation, he became entitled to about all the credit that can be attached to the instrument. The improvements which my instrument presents are merely details contributing more perfect illumination, convenience and durability. The improved system of illumination has been made use of in the urethroscope and cystoscope, tho I did not know of this until recently. Others had been working on the same idea; for instance in 1914, Dr. Harry Gradle of Chicago, wrote to me and said that my model was so similar to the one he had been working upon that he proposed to discontinue perfecting his.

Since my relations with the reader of the paper have never been cordial and for the past year or more have been "diplomatically severed," I was not even aware that he had constructed an electric ophthalmoscope which he kept in his office for his own use since 1912, without allowing his confreres to share in the advantages, if any, which might accrue from his ideas. Furthermore, I

received no hint from the Wappler Electric Co., that they had had any relations with Dr. Koller in connection with an electric ophthalmoscope or else I would, under no circumstances, have given them my model for manufacture, since I had been negotiating with another concern in 1913.

CHARLES H. MAY.

New York City.

Glaucoma with Influenza.

To the Editor:

I have a case which goes to show the wide variation of untoward sequelae following influenza.

The patient, a woman of fifty-five years, presented herself one month after the onset of influenza with an advanced and pronounced glaucoma. Both pupils would not react to light, practically blind in the right eye, and vision reduced to 20/200 in the left; color fields very much reduced. She reports that shortly after she became ill with the influenza, she noticed a hardening of the eyeball. I had never seen so much diminution of visual acuity with glaucoma in so short a time, except in the fulminating type.

L. A. SCHIPFER.

Bismarck, N. D.

Infection Thru the Conjunctiva?

To the Editor:

During the post influenza period, at the time when a lot of talk was current "pro and con" the face mask as a means of partial protection, some one casually observed that not a great deal was to be gained by wearing a mask over the mouth and nose as a protection against droplet infection, because the eyes were a source of infection to the respiratory passages thru mechanical passage of organisms received in the eye and carried down thru the ducts into the nasal cavity, etc. We undertook some simple experiments here, inoculating the eye with easily detected organisms such as *Prodigiosus*, trying to recover the organism in various portions of the throat and nasal cavity. At

no time were we able to recover such organism.

Before we go into this further, we would like to inquire of your readers as to any work of this kind that has already been done. We are so shut off in this place from adequate library facilities that we continually fear that anything that we become interested in may have already been neatly and com-

pletely worked out—vastly better than we could possibly do it here. Would you then favor us with any citations to work of this kind, and also to any available data as to the germicidal or antiseptic action of tears.

CAREY P. McCORD,
Major, M. C.

Base Hospital Laboratory,
Camp Sherman, Ohio.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C. Volunteers are needed in other localities.

DEATHS.

Dr. William Cheatham, of Louisville, Kentucky, April 3rd, from angina pectoris, aged 66.

Dr. Wallace Clark, of Utica, New York, March 16th, aged 69.

Dr. William Pearson Cowper, Edinborough, February 1st, aged 38.

Sir William Crookes, in London, April 5th, at the age of 86.

Sir James McKenzie Davidson, in London, April 2nd, aged 62.

Dr. Paul Herman Dernehl, of Milwaukee, at his home, March 28th, from diabetes, aged 40.

Dr. Osee Wallace Hoffman, in Denver, March 5th, of tuberculosis, aged 43.

Dr. R. A. Lundie, Edinburgh, December 18th, 1918.

Dr. E. H. Noble, Elmira, New York, March 6th, aged 53.

Dr. E. W. Nordensen, Swedish ophthalmologist, recently in Stockholm.

Dr. Frank Van Fleet, New York, April 5th, aged 58, of heart disease.

PERSONALS.

Dr. J. N. Reik, of Baltimore, has returned from France, and has resumed practice.

Dr. James E. Carroll, of Baltimore, has recovered from a recent attack of pneumonia.

Dr. Melville Black, of Denver, is spending a few weeks' vacation motoring in southern California.

Dr. Emory Hill, formerly of Chicago, has removed to Richmond, Virginia, and opened offices in the Professional Building.

Dr. J. G. Linn, of Pittsburgh, Pa., is mustered out of the service, and resumed practice in the Highlands Building.

Dr. Wm. McL. Ayres, of Cincinnati, is still in France, connected with Base Hospital, No. 110.

Dr. H. H. Stark, of El Paso, Texas, has been honorably discharged from the Medical Corps of U. S. A., and has resumed practice.

Dr. James H. McKellar, of Pasadena, Cal., has reopened offices, 618 Title Insurance Building.

Dr. Charles P. Small has completed his term of government service and has opened offices in Suite 1111, Michigan Boulevard Building, Chicago, Illinois.

Dr. Thomas A. Woodruff, formerly of Chicago, announces his removal to New London, Connecticut.

Dr. Hans Barkan has been transferred from the Base Hospital at Camp Kearney to the Letterman General Hospital at the Presidio at San Francisco.

Dr. George U. Huber, of Coffeyville, Kansas, is convalescent after being ill eight weeks with influenza.

Dr. Harold Gifford, of Omaha, will be the guest of the Pacific Coast Oto-Ophthalmological Society meeting in San Francisco in August.

Dr. J. O. McReynolds, of Dallas, Texas, as president of the Medical Department of

the air service of the army, the Flight Surgeons' Association, presided over a meeting of the association, which met in Dallas, March 24-26.

Dr. Alan Kinisely, Jr., of Lima, Ohio, has just returned to that city from his army service.

Dr. Howard Hoyt Shiras, after completing his ophthalmic service at the N. Y. Eye and Ear Infirmary last year, was stationed at Camp Greenleaf. He has returned to Cleveland to resume his practice.

Major John R. Newcomb received an honorable discharge from the service April first, and has returned to Indianapolis to resume his practice. Upon his discharge, Dr. Newcomb received a commission as Lieut.-Col., in the Medical Corps.

Col. P. J. H. Farrell of Chicago, who has been commanding officer of two base hospitals in the advance sector in France, was recently in Germany on special duty.

The following Chicago ophthalmologists have completed their terms of army service and have resumed their private practice: Harry S. Gradle, Herbert Walker, E. K. Findlay, Sidney Walker, Jr., Chas. J. Swan, Chas. P. Small, Frank Brawley, G. W. Boot.

Dr. Edward E. Maxey of Boise, Idaho, has received his discharge from the service, and will resume his practice in association with Dr. R. L. Nourse.

Dr. L. S. Moore, who recently finished an internship in the Illinois Charitable Eye and Ear Infirmary, is now associated with Dr. P. A. Jordan of San Jose, Calif.

SOCIETIES.

At the meeting of the Section on Ophthalmology of the New York Academy of Medicine, March 17, papers were read by Lieut.-Col. G. S. Derby on "Eye Work with the British and American Expeditionary Forces," and Capt. G. H. Grant, "Restorative Surgery After War Injuries to Eyes." At its meeting of April 21st, papers were read by Dr. Alfred Wiener on "The Radical Treatment of Epiphora," and by invitation, Dr. C. R. Holmes, of Cincinnati, on "Extirpation of the Lacrimal Gland."

The Oxford Ophthalmological Congress, Sydney Stephenson, master, will assemble

at Keble College, Oxford, on the evening of Wednesday, July 9th, next, and the meeting will be held on Thursday, the 10th, and Friday, the 11th, of July.

The first day, Thursday, the 10th, will be largely devoted to a discussion on "Preventative Ophthalmology," to be opened by Colonel J. Herbert Parsons, A. M. S., consulting ophthalmic surgeon to the forces. Members intending to take part in the discussion are requested to kindly send in their names to the honorary secretary at their early convenience.

The second day, Friday, the 11th, will be given up to papers, demonstrations, and cases, etc. It is hoped that members will make every effort to contribute to the success of the meeting with cases, specimens, new operations, or novelties of any kind. If, therefore, you have any such that you are willing to bring forward, will you kindly notify the undersigned at the earliest opportunity and your contribution will be welcomed.

The annual general meeting will be held in the evening of Thursday, July 10th.

BERNARD CRIDLAND,
Hon. Secretary.

At the meeting of the Chicago Medical Society on May 7th, Dr. Cassius Westcott read a paper on "The Relation of the Teeth to the Eyes."

Dr. P. A. Jordan of San Jose, Cal., was elected Chairman of the Eye, Ear, Nose and Throat Section of the California State Medical Society, held at Santa Barbara, April 15-17.

On May 12th the Chicago Ophthalmological Society held its last meeting until October. The program consisted of papers and discussions on various Compensation Tables for Eye Injuries.

MISCELLANEOUS.

The St. Louis Medical Society has appointed a committee to organize clinics in that city for the purpose of establishing a method of work to be done in each clinic from day to day in order that the local profession and visiting physicians may have opportunity to observe work done by St. Louis physicians. Dr. E. H. Higbee, Jr., has been appointed chairman of the Committee on Ophthalmology.

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